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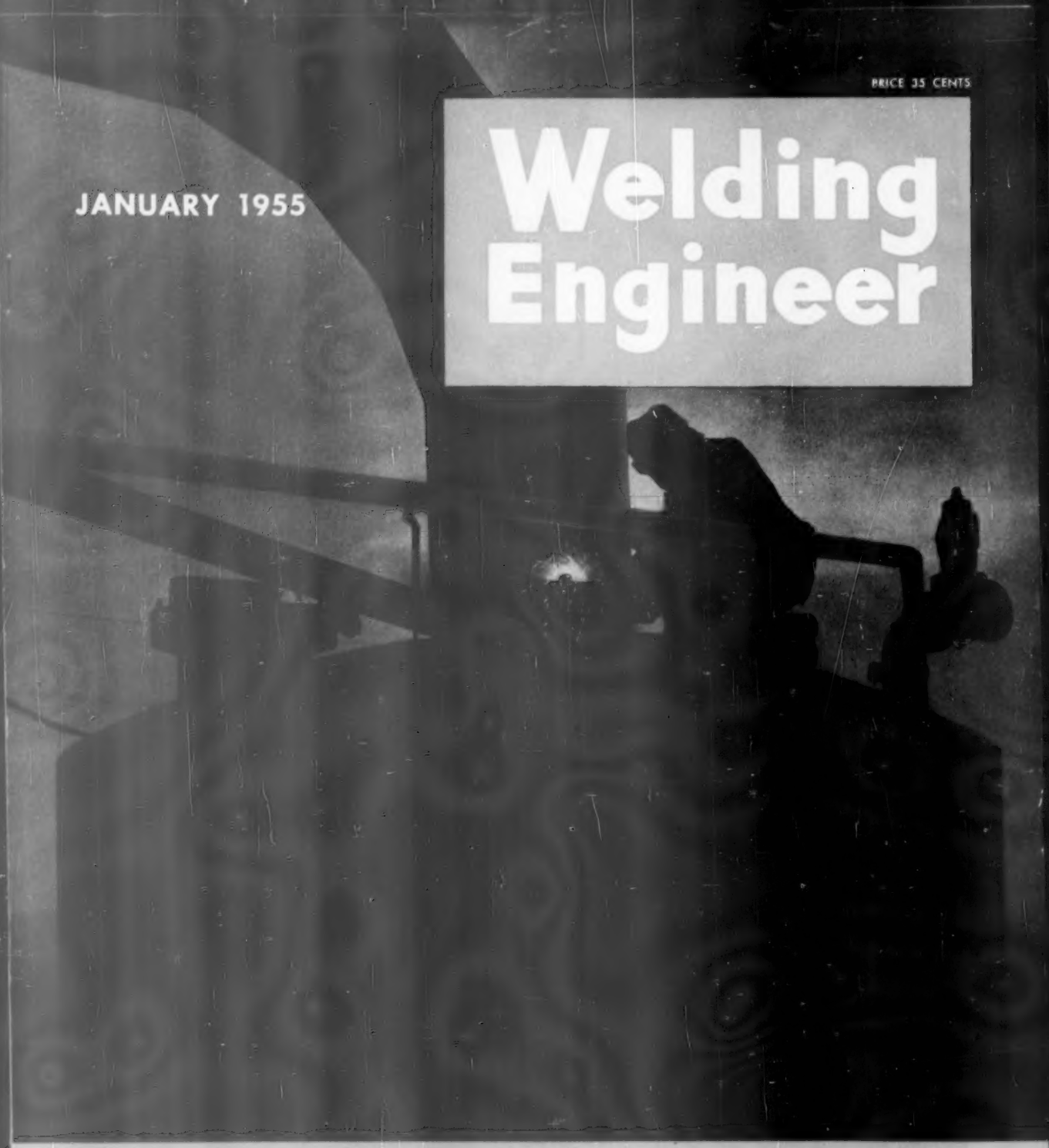
JANUARY 1955

Welding Engineer



In This Issue

Welded maintenance in paper mill 23

Hospital designed for welding 30

Select the right grinding wheel 44

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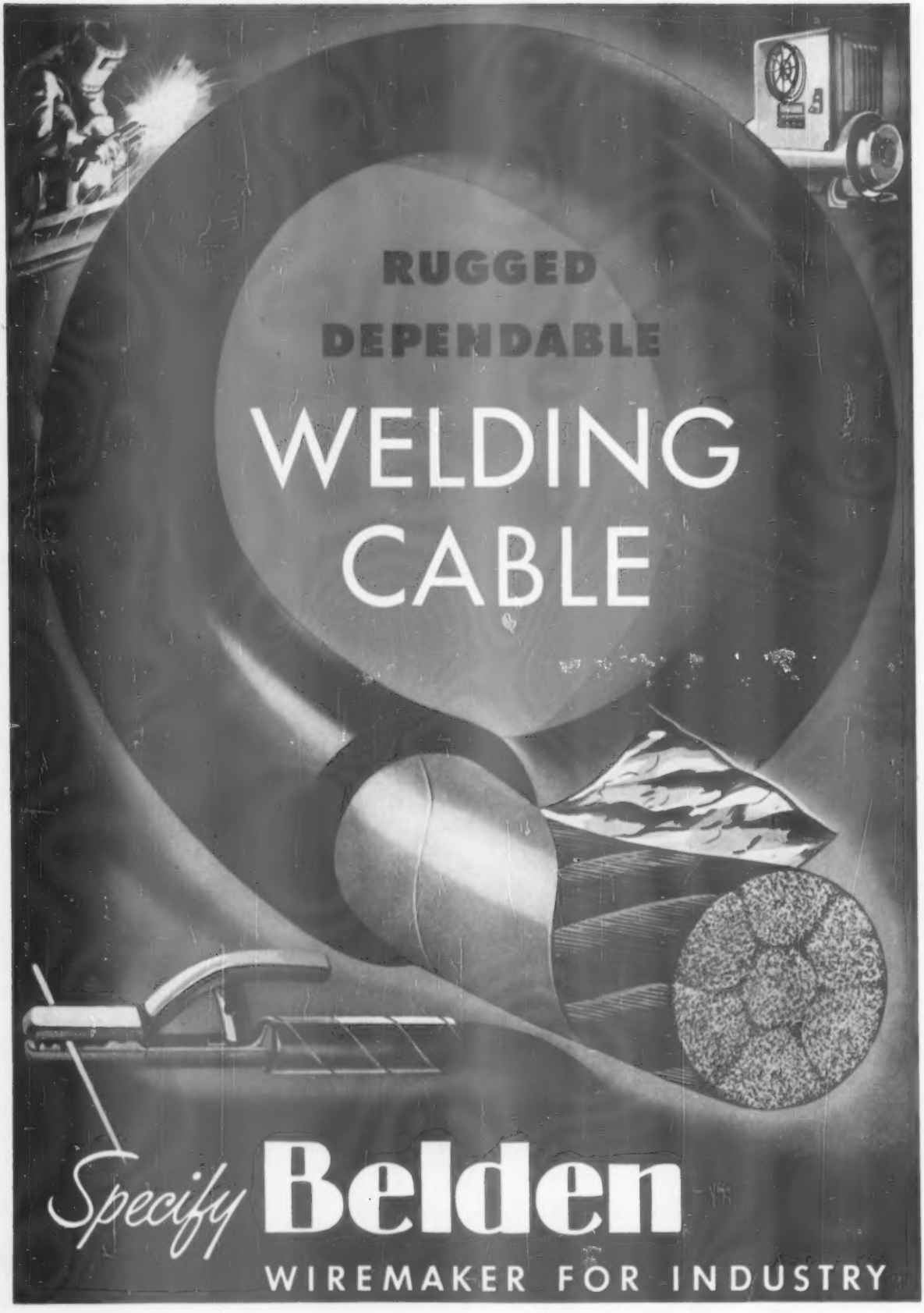
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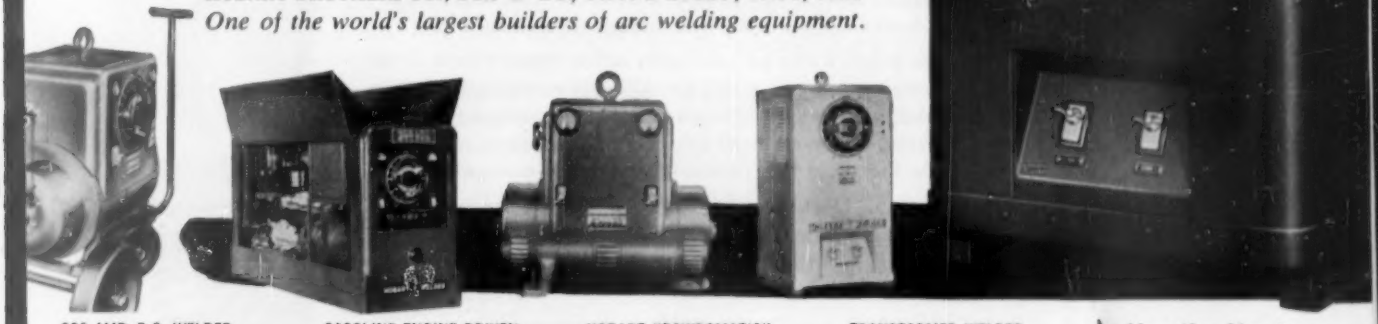

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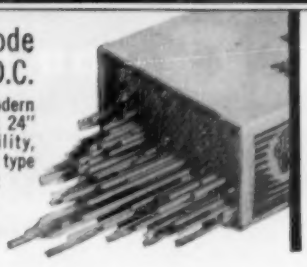
Here's an electrode in keeping with modern welding procedures. The new "Rocket 24" gives greater speed, maneuverability, strength and smoothness. It's a contact type electrode, heavily coated, employing iron powder in the coating which becomes a part of the weld. Write for free samples.



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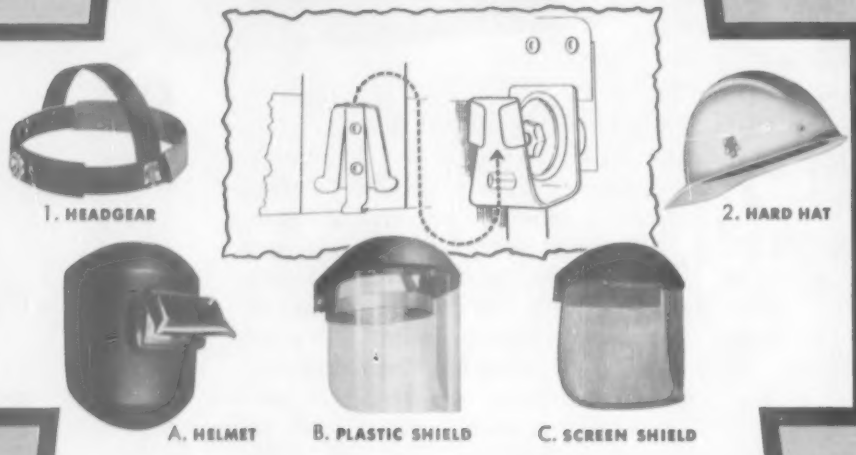

Assemble Your Own Combinations

Here's a way for you to save money on head, face, and eye protection equipment. Now you don't have to buy duplicate headgears or hats. If you need a helmet (A) and face shield (B), buy them along with only one headgear (1) or hard hat (2).

Items **A, B** and **C** can be used with either items **1** or **2** illustrated above so you can make six different combinations. The old-fashioned way you would buy a helmet and headgear, a shield and headgear, and so on until you had six combinations (twelve items) to do the same thing these five separate pieces will do.

The New CESCO Mounting has an easily adjusted tension spring to compensate for weight differences. Tilting mechanism permits easy raising and lowering. Wedge shaped brackets slide apart or together quickly, and lock securely.

Save buying extra parts... save money.
On your next order specify CESCO interchangeable helmets and face shields. They're—
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JANUARY, 1955

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MAINTENANCE

Paper to pulp . . . pulp to paper 23
Clyde B. Clason

PRODUCTION

Welded cyclones assure smooth flow 28
Herman C. Phelps

Big blades clad by series-arc 33

Stack assembly production line 36
Gilbert C. Close

Monocoque aluminum trailers 42
Howard E. Jackson

CONSTRUCTION

Hospital designed for welding 30
Heathcote W. Lawson

FABRICATION

New long-track "Tank Master" 34
Jerome W. Wood

This tooling-up was easy 39
Herman C. Phelps

OPERATION

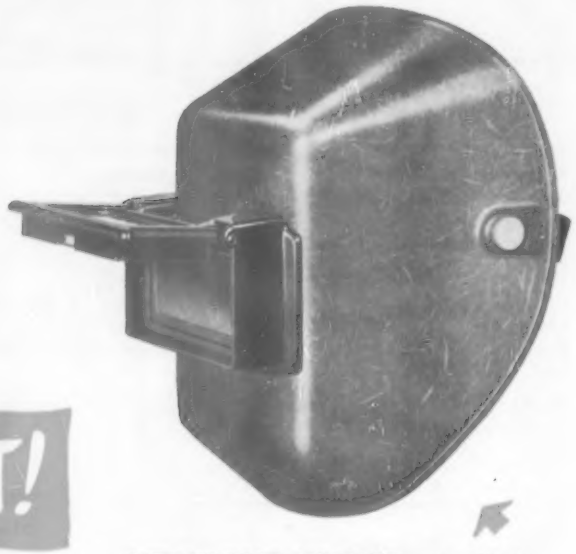
Simplified bookkeeping forms 40
B. L. Gough

Select the right grinding wheel 44

DEPARTMENTS

News 5
Letters to the editor 8
Editorial: Announcement 21
Cartoon feature: A weldor's woes 32
Data sheet No. 172: Grinding wheel recommendations 47
On the job 49
New products 50
Free literature 80
Welding Info-Aids 81
30 years ago 90
People 91
Patents 96
Searchlight 97
Where to buy 97
Advertisers in this issue 98

FIXED-FRONT HELMET type H-3
has light metal lens holder. Cover glass is replaced from the front by sliding it out without disturbing other parts.



Another Jackson FIRST!

Two Helmets in Popular Narrow-Front Style Now Made in Modern Fiber-Glass Plastic

For the first time, Jackson offers two welding helmets in the popular shape favored by many weldors to make work easier in the tight spots. Type H-3, with fixed front, and H-4, with lift front are otherwise similar to the other Jackson Helmets, but somewhat lighter in weight.

Helmets H-1 and H-2 have long since proved the economy of long-lived fiber-glass over vulcanized fiber. More resistant to heat and moisture, they hold their shape, withstand weld spatter and high voltage, are strong, smooth, easy to clean, and attractive in appearance.

Headgears are of smooth plastic, easy to clean, with inexpensive, snap-on, cork-padded sweatband. Calibrated to hat sizes in ⅛-inch steps, they are quickly fitted. Friction pivots are adjustable by hand while helmet is worn. Helmets can thus be made to float down without jolts, and stay in any desired position.

LIFT-FRONT HELMET type H-4
permits work inspection without raising the entire helmet. The lens holder is of high-impact thermosetting plastic with hinged door held up or down by coil springs. Filter lens is protected by a cover glass, and a second clear glass stays in place when front is up to protect the eyes from flying particles.

type H-2

type H-1

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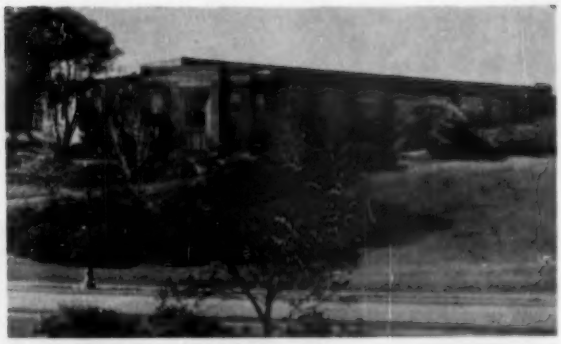
OLD site of The Harris Calorific Co. was erected in 1917. The firm in 1936 moved to . . .



PRESENT plant. Welding-equipment company was founded 50 years ago

NEWS

Harris Calorific celebrates 50th anniversary this year

THIS year will mark the golden anniversary of The Harris Calorific Co., Cleveland manufacturer of gas-welding and cutting apparatus. It was back in 1905 that John Harris incorporated the company, which started doing business in a small shop with a handful of men. (Today the firm's site is considered one of the outstanding factory buildings in Cleveland.)

Making synthetic rubies was Harris' hobby. In 1899, while trying to build the "biggest and best" ruby, he accidentally discovered flame-cutting. His machine consisted primarily of a central copper tube through which he fed aluminum oxide powder. Surrounding this center tube was a series of other tubes, more or less parallel and converging toward the business end. Through the latter tubes he carried an oxyhydrogen mixture of gases, which burned at the business end and produced a series of hot flames, completely surrounding the center tube. In operation, the powdered oxides would pass through the flames and would gradually build up a ruby on a steel plate below.

Campbell

While trying to build this "best" ruby, something happened. Trying to save the stone already built up, Harris seized a pair of pliers and pulled out the plate holding the stone. . . . The plate had been "cut." As far as is known, this was the first instance of flame-cutting in this country.

Harris exhibited acetylene torches for the first time at the St. Louis World's Fair in 1904, just prior to the founding of Harris Calorific (Calorific is derived from the word "calorie," the basic unit of heat.).

By the time Harris retired in 1926, he had been granted more than 70 patents. His position was taken over by Lorn Campbell, Jr., who still is president and general manager. Campbell had been president of the United States Welding Co., Minneapolis, a company he founded in 1915 with Cyrus K. Rickel.

1955 calendar of events

MARCH 22-24: International Acetylene Association, 55th annual convention, Shamrock Hotel, Houston.

MARCH 28-APRIL 1: Ninth Western Metal Congress & Exposition, Ambassador Hotel and Pan-Pacific Auditorium, Los Angeles.

MAY 18-20: National Welding Supply Association, 11th annual convention, Edgewater Beach Hotel, Chicago.

JUNE 7-10: American Welding Society, national spring meeting, Kansas City, Mo.

OCT. 17-21: American Welding Society, 36th annual meeting, and 37th National Metal Congress and Exposition, Philadelphia.

Welding library presented to Armour Research

A COMPLETE collection of books and articles on the various phases of welding has been presented to Armour Research Foundation of Illinois Institute of Technology, Chicago.

The collection, which includes basic information on welding processes and design, is the gift of The James F. Lincoln Arc Welding Foundation, Cleveland.

Orville T. Barnett, supervisor of ARF welding research, said the collection will be kept up to date through the addition of significant books, articles, and other publications.

* * *

Welding show in Toledo Jan. 19-21

AN open house and welding show will be held from 1 to 9 p.m. Jan. 19 through 21 by Williams and Co., Inc., at its 40,000-sq-ft warehouse at 946 Kane St., Toledo, Ohio. Persons in attendance will have an opportunity to see grouped under one roof about 35 booths staffed by as many leading manufacturers of welding equipment. Films illustrating uses of welding and brazing in industry will be shown at regular intervals.

Organized in Pittsburgh in 1907, the Williams firm now operates six completely stocked warehouses in Cleveland, Columbus, Cincinnati and Louisville as well as in Pittsburgh and Toledo.

* * *

Owens Welding Co. opens another plant

OPENING of Plant No. 3 on the west side of Detroit was recently announced by Rex Farmer, president of Owens Welding Co., Inc. The announcement claimed this makes the firm the largest tool and die welding specialists in the country.

VISITORS to new liquid-oxygen plant saw live demonstrations of welding and cutting

NEW Jersey distributor exhibited new equipment at Industrial Exposition

Air Reduction holds open house at new oxygen plant

MORE than 165 visitors recently took advantage of Air Reduction Sales Co.'s invitation to attend an open house and inspect the new 80-acre liquid-oxygen plant at Riverton, N. J. Visitors were given a guided tour through the plant and were then treated to live demonstrations and a buffet lunch.

Dr. A. H. Taylor, manager of the analytical division of Air Reduction Co., Inc., at Murray Hill, N. J., acquainted visitors with the potency of liquid nitrogen at the nearly unbelievable temperature of —320 F. He dipped a small bell made entirely of lead into the liquid. After only a few moments immersion, it had a near-perfect bell tone.

He also poured liquid mercury around a wooden hammer handle held vertically in a container. After a few moments immersion, the mercury was so solid Dr. Taylor could break most any breakable objects. Contrariwise, an ordinary frankfurter became so brittle that it shattered and flew out into the audience when flicked with a finger after a momentary dip into the liquid nitrogen.

The main production building at Riverton houses two big producing columns, each capable of turning out 55 tons of liquid oxygen a day—a total daily capacity of 110 tons—and a monthly capacity of about 75,000,000 cu ft. Full-scale production at Riverton coincides with the closing down of Airco's first and oldest oxygen plant at Germantown and Allegheny Aves. in Philadelphia 9 miles away. The modern Riverton plant, with daily production of more than 25 times that of the Philadelphia plant, now serves the Philadelphia territory.

Each producing column at Riverton has a control panel which consists of automatic controls and analysis equipment. In addition to automatic operation provided with this equipment, the operator can also tell temperatures, pressures, flows, and analysis of the various gases throughout the entire manufacturing process. An audible signal system notifies the operator the moment any phase of the operation is off control.

The facilities at Riverton also serve as a large distribution point for the Philadelphia-Camden area of every product in Airco's extensive electric arc welding and oxyacetylene welding and cutting line. Items ranging from welding tips to automatic welding and cutting equipment are stored and sold directly to users and dealers in the area. Oxygen, nitrogen and argon are also sold in gaseous form by converting substantial portions from liquid to gas at the plant. Calcium carbide is stocked in drums and sold to industries that operate acetylene generators. Acetylene gas is also sold in cylinders. Helium, used with Airco's Tig and Mig welding processes, is also marketed.

* * *

Menzies named Hallwell distributor for Midwest

J. C. MENZIES and Co., Chicago, has been named exclusive distributor for Hallwell Tool Co., Los Angeles manufacturer of welding clamps. The Chicago firm will distribute Hallwell products in an eight-state area comprising Illinois, Iowa, Indiana, Wisconsin, Michigan, Minnesota, Missouri and Kentucky.

Essex exhibits at industrial show

ONE of the largest distributors in the New York-New Jersey area, Essex Welding Equipment Co., displayed its complete welding service facilities and equipment at the recent New Jersey Industrial Exposition. Exclusive distributor for Hobart welding equipment in that state, Essex has been in business for the past nine years.

One of the new and improved developments shown by Essex at the Exposition was the Hobart "Powromatic" constant-voltage welder (which was also shown at the recent Metal Show in Chicago and is included in WELDING ENGINEER'S new products this month).

Essex represents about 37 manufacturers in the welding industry.

* * *

Specimens buried by storm recovered by mine detectors

EQUIPPED with mine detectors, U. S. Marines from Camp Lejeune, N. C., literally sought buried treasure recently at the site of International Nickel Co.'s sea spray corrosion test lot on the Atlantic at Kure Beach, N. C. The Marines were assisting in the search for thousands of valuable specimens torn by Hurricane Hazel from racks 80 ft from the ocean and buried deep in the sand by wind and waves.

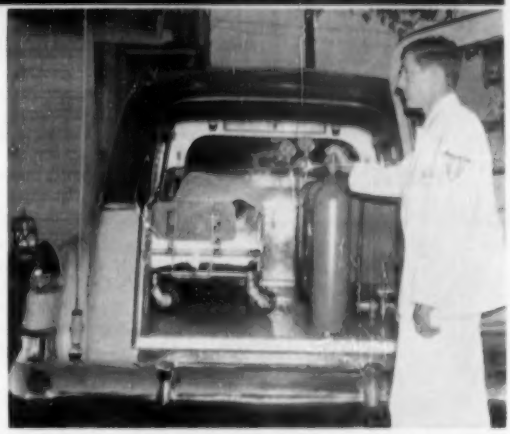
The lot formed part of the corrosion testing station established in 1935 and recognized today as the most extensive research project of its kind in the world. Activities at this station have yielded information on how bare and coated metals, plastics and other materials are able to resist corrosive effects of salt water, salt

(Continued on page 78)

The ambulances of Bowers Ambulance Service, of Long Beach, California, are the products of experts. . . .

Among the finest ambulances made in America are those of the Bowers Ambulance Service of Long Beach, California. From Cadillac Chassis to National Oxygen Regulator, no effort has been spared to select only tested, reliable, dependable equipment. When life hangs in the balance no mechanical trouble must have the slightest chance to tilt the scales against the patient.

Regardless of how much money you care to spend, you cannot buy finer single or two-stage reduction regulators than those made by NATIONAL of California. Whether for minute or vast hourly gas requirements, at very low or extremely high delivery pressures, no regulators will give you better service or more trouble-free performance than will . . . . .



Because only the very finest equipment is chosen, National Oxygen Regulators are "standard" here.

National of California

No other regulator is so easy to adjust and no others will hold that pressure adjustment more steadily. Designed and built for the merciful hands of the hospital nurse, the sturdiness of these regulators will withstand the toughest operations in shop or field. Intended to sustain the flickering life of the injured or the ill, it will maintain the finest torch flame adjustment regardless of weather or gas volume.

One touch of the adjusting screw and you will know why NATIONAL of California regulators have won the test of time. Made by an organization with nearly half a century of experience in the fields of high pressure gas equipment design and manufacture, you can rely upon these products.

These regulators will require reconditioning but seldom; but, when they do, this job has been so simplified that any competent repair man, anywhere, can do so easily. . .

write for free brochure no. 4 —44 pages packed with interesting information and 30 color and black & white pictures.

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542 DEPT. 143

Make fast, easy welds on "hard-to-join" and dissimilar metals

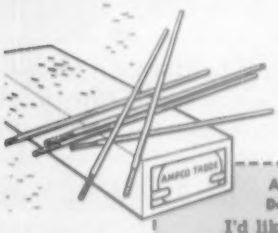
Use AMPCO-TRODE* 10 bare wire with the metal-arc, inert-gas process

Here's real versatility. Use Ampco-Trode 10 bare wire with the metal-arc, inert-gas process and you're set to make easy work out of tough welding jobs. You get strong aluminum-bronze welds that are dense, ductile, crack-free. You join silicon bronzes without cracking. And you make excellent, high-strength welds in iron-base metals — cast and malleable iron, galvanized iron, and high alloy steels and irons.

Ampco-Trode 10 gives you top-grade welds when you join dissimilar metals — cast iron to steel, cast iron to bronze, steel to bronze, etc. And it's ideal for overlays that must fight severe wear and corrosion. You get a deposit hardness of 160-190 BHN and excellent resistance to many corrosive media — salt water, many acids, mild alkalies.

Ampco-Trode 10 bare wire is stocked on rims and spools in .045", 1/16", 5/64" and 3/32" diameter sizes for use with metal-arc, inert-gas. Also available in electrodes and filler rod for other welding processes. Order it now for speed and satisfaction in difficult welding jobs.

*Reg. U. S. Pat. Off.



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I'd like to know more about welding with Ampco-Trode — aluminum bronze electrodes. Send me bulletin W-17.

Name..... Title.....

Company.....

Company Address.....

City..... (.....) State.....

W-131

Letters should be addressed to: The Editor, WELDING ENGINEER, 12 E. Grand Ave., Chicago 11, Ill. No letter will be published unless signed, but your name will be withheld if you request it.

Atomic sub

Dear Sir:

We would like your permission to reprint a story appearing in the November issue of WELDING ENGINEER on the *U.S.S. Nautilus* ("New turning rolls help weld the *Nautilus*," page 46). We will credit you for the reprint. . . .

Thank you very much for your anticipated coöperation.

Sincerely,
Marcia Maleckas
Advertising & Sales Promotion
Worthington Corp.
Harrison, N. J.

We are pleased to extend our permission.

• • •

Liked presentation

Dear Sir:

Thank you for sending me a copy of the November WELDING ENGINEER containing my article, "New flames for torches." I am very pleased with the presentation of it. The format is excellent. . . .

Very truly yours,
James A. Browning
Thayer School of Engineering
Dartmouth College
Hanover, N. H.

• • •

Welded bridges

Dear Sir:

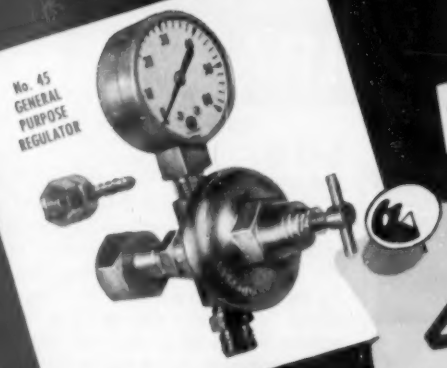
When I received your letter not long ago telling me that you had heard that opposition to welded bridge construction on the part of the Bureau of Public Roads was preventing the use of welded bridge construction on the new Kansas Turnpike, there was some question in my mind as to the accuracy of this report.

George W. Lamb, formerly bridge engineer of the Kansas State Highway Commission, and more recently a district engineer of the American Institute of Steel Construction at To-

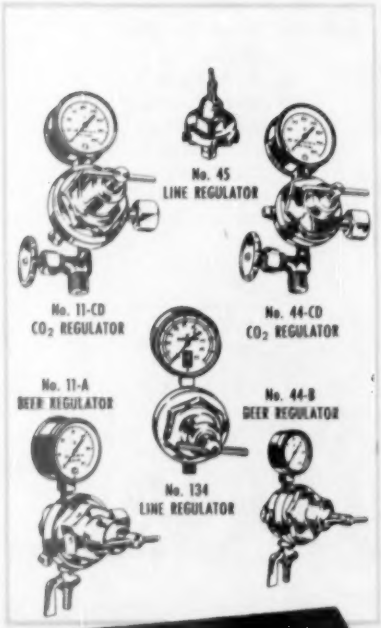
DEPENDABLE

SAFE

ACCURATE



Dockson REGULATORS are *Built for Better Service!*



Over 30 years of constant field and laboratory testing assure you of a functionally designed, carefully manufactured, low-cost regulator.

Dockson "Better-Built" Regulators incorporate ALL the features you have asked for—heavy-duty, forged brass bodies; a minimum of moving parts; self-aligning, easily replaceable seats; extremely sensitive, sturdy metal diaphragm that works with—instead of against—incoming pressure; dependable safety valves against excess pressure; and shatterproof gauges.

All Dockson Regulators are GUARANTEED for one year against any defect in material or workmanship in the regulator proper.

Whatever your regulator needs are—acetylene, CO_2, air, fuel gases or water—you can rely on Dockson.

Dockson CORPORATION

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Bridgeport No. 192 Low Fuming Bronze Rod

for quicker repairs... for regular production

Braze-welding with Bridgeport's No. 192 Low Fuming Bronze Rod makes sound, lasting repairs quickly. Since only local heating is needed before this free-flowing rod begins to "tin," elaborate preheating setups and cooling are unnecessary—expensive down time is saved. What's more, braze-welds are frequently stronger than the original metal.

Bronze Welding Rod can be used for regular production and for building up of worn surfaces. In the photograph shown, the lugs on these wringer roll clutch plates have been formed by building up with No. 192 Low Fuming Bronze Rod. The entire story of braze-welding is in our booklet, "Bronze Welding Alloys." We will be glad to send you a copy.

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peka, has now resigned from the Institute to serve as bridge engineer on the Turnpike. Mr. Lamb has had long experience in welding for bridge construction in Kansas and the Midwest, in general, as well as in welded marine construction, and he is very enthusiastic about welding.

I have just received a note from him which tells me that a lot of welded girders will be used on the Kansas Turnpike. This leads me to believe that if there was serious opposition from the Bureau of Public Roads, this has now been overcome.

Sincerely yours,
LaMotte Grover
Air Reduction Sales Co.
New York 17.

* * *

"Better late . . ."

Dear Sir:

I regret that I did not recollect when I saw you in Buffalo in May to compliment you on your forthright editorial in the March issue of WELDING ENGINEER, "Ignorant ingenuity." To say your exposition is "inspirational" is an understatement; it should put the fire in all of us to do better.

My criterion for a top weldor has been his ability to know "when to stop." My man would still qualify within the limits set forth in your article.

To stop short of trying "everything" is simply to admit inability to stand on one's own feet.

Thanks for your thoughts about the pitfalls resulting from getting too dogmatic in our thinking.

Cordially,
E. B. LaVelle
Welding Engineer
General Electric Co.
Hanford Atomic Products Operation,
Washington

HARRIS 1905 — 50TH — 1955 ANNIVERSARY

"Fifty years of Achievement". We say this proudly-but are humble in our thanks to our thousands of users, our distributors and to our employees, present and past, who have enabled us to become the oldest company in this country devoting all our interests to the manufacture of Gas Welding and Cutting Apparatus.

Our many "firsts" have blazed an envious trail and have inspired us to develop even more unusual "firsts" which will be presented in the future to the Industrial World.

THE HARRIS CALORIFIC COMPANY

CLEVELAND 2, OHIO

for high speed welding of hard-to-weld steels

Speedex-LH

the new MUREX® low hydrogen-contact electrode

Speedex–LH combines all the advantages of a low hydrogen electrode with those of a high speed contact electrode. It yields deposits extremely low in hydrogen content. At the same time, its heavy coating, containing powdered iron, provides deposition rates up to 60% faster than those obtained with regular low hydrogen electrodes.

Speedex–LH can speed your welding–save you time and money on many types of work, including:

1. *Welding of hardenable steels without preheat and without danger of underbead cracking.*
2. *Welding high sulphur steels without porosity.*
3. *Welding of cold rolled steels which tend to produce pin-holing when welded with conventional electrodes.*
4. *Welding low alloy or mild steels without cracking where stress relieving normally would be employed, but is not feasible.*

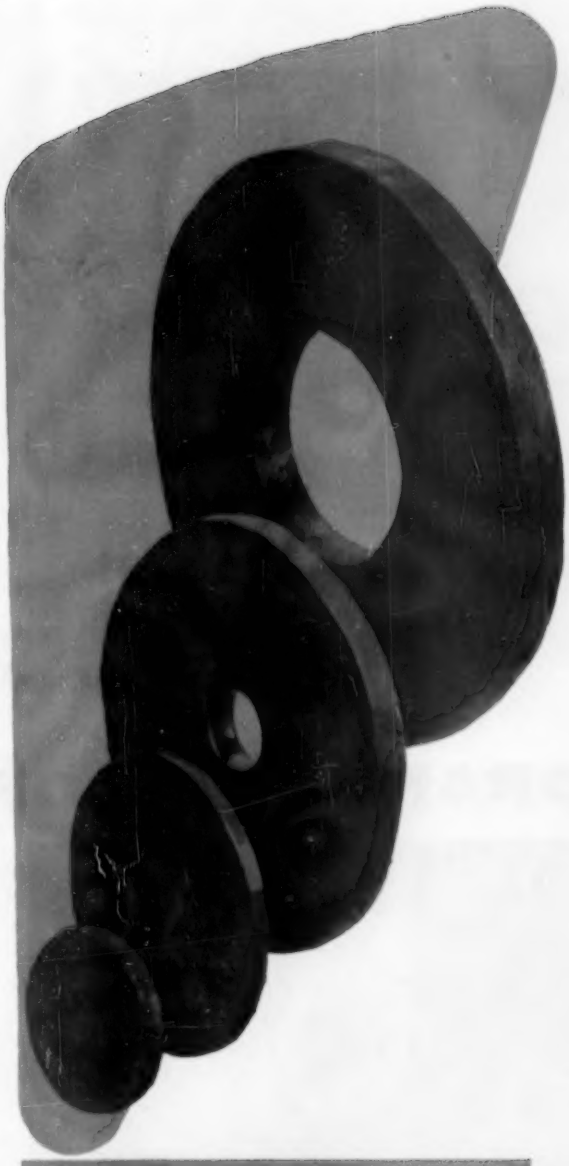
Ask to have Speedex–LH demonstrated. Contact your welding distributor or nearest M&T representative.

METAL & THERMIT CORPORATION

100 EAST 42ND STREET · NEW YORK 17, N. Y.

MUREX electrodes • arc welders • accessories

Seam Welding Wheels performance-fitted for your job



Two families of Mallory *seam welding wheels* now give you a choice of operational qualities, from which you can select the type that best matches the performance and economic requirements of your application. Both are available as rough forgings, or finished-machined to your specifications.

For severe service, Mallory cold-forged wheels offer the peak in performance. Special Mallory forging techniques produce a metallurgical structure that has excellent uniformity, hardness and conductivity. Made of a variety of Mallory alloys, these wheels set the highest standards for long life, consistently top welds, and long runs between dressing. Alloys are available for welding all kinds of materials including coated metals, aluminum and magnesium alloys, and stainless steel.

For less stringent duty, a line of wheels made of Mallory 3 Metal is produced *without* the cold-forging operation. Their cost is correspondingly lower, and their performance is amply good for many jobs.

Let Mallory welding engineers help you choose the type of wheel that your specific application requires. And write today for your copy of the latest Mallory Resistance Welding Catalog . . . or get one from your local Mallory distributor.

P. R. MALLORY & CO. Inc.

MALLORY

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

In Canada, made and sold by Johnson Matthey and Mallory, Ltd., 110 Industry Street, Toronto 15, Ontario

Expect More . . . Get More from MALLORY

STOCK ELECTRODES

Hundreds of shapes and sizes are available in stock . . . with round water holes or the exclusive Mallory fluted cooling hole for longer life between dressings. Save you both cost and delivery time.

STANDARD ELECTRODES

Odd-shaped electrodes you consider "specials" may well be standard items for Mallory . . . can be made quickly with existing tools, in a wide range of single-bend, double-bend and irregular shapes.

For information on titanium developments, contact Mallory-Sharon Titanium Corp., Niles, Ohio

CARBOFLEX

TRADE MARK

depressed center wheels

BRAND NEW...FOR FAST, SAFE

Wheel guards removed to show cutting action

Reduce rough welds...*fast, safely!*

Remove flash from castings...*fast, safely!*

continually putting **more sense** in your **abrasive dollar...**

Wheel guards removed to show cutting action

Finish rough edges... *fast, safely!*

Cut off or slot... *fast, safely!*

ROUGH GRINDING AT LOW COST

Roughing? Grinding Welds? Cutting off? Slotting?—here's a great new cost-cutter by CARBORUNDUM to help you do a fast, safe job. CARBOFLEX Depressed Center Wheels are strongly reinforced for complete operator safety, yet give you an *extra-high rate of cut.*

Here are some typical jobs where CARBOFLEX Depressed Center Wheels have proved their superiority: under-cutting and reducing heavy welds, cleaning castings, roughing off fins and sharp edges, notching and cutting off gates and risers, removing surface defects, and general purpose roughing, slotting and cutting off.

An exclusive feature of the CARBOFLEX Depressed Center Wheel: the back, as well as the face, is knurled. You can cut with either side plus the edge, without initial dressing.

The right combination of tough, top-quality abrasive grain and a strong, reinforced bond is what makes CARBOFLEX Wheels so effective. Tough, durable CARBOFLEX Depressed Center Wheels combine extreme high strength and resistance to cracking with maximum cutting ability... the only combination that gives you more production per wheel at less abrasive cost.

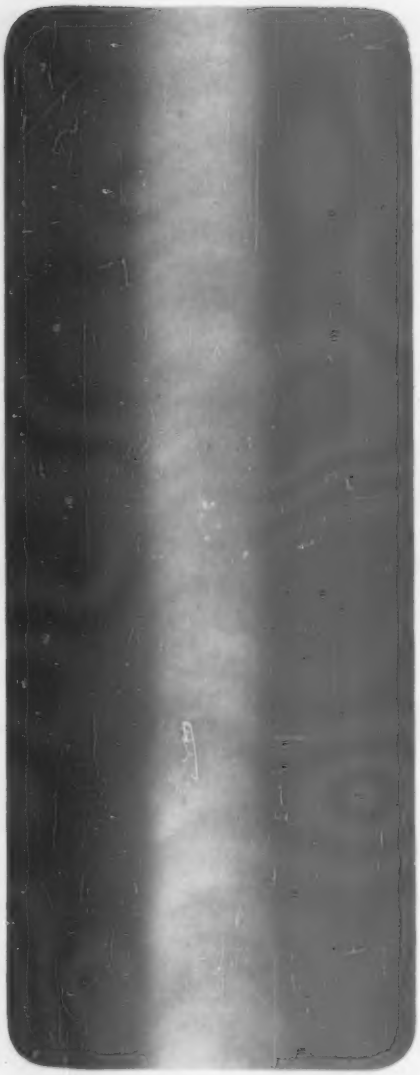
Use CARBOFLEX Depressed Center Wheels on your toughest jobs. You'll be more than pleased with the results!

● **OUR DISTRIBUTOR OR SALESMAN** is ready to demonstrate this new cost-cutter. He's listed in the yellow pages of your telephone directory—under "Abrasives" or "Grinding Wheels." Call him... or, if you prefer, write to The Carborundum Company, Dept. WE 81-41, Niagara Falls, N. Y.

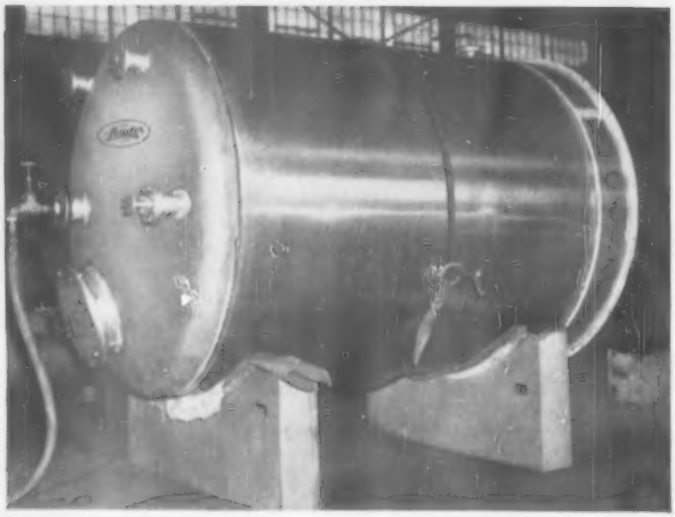
CARBORUNDUM

REGISTERED TRADE MARK

81-41



RADIOGRAPHY makes positive about negative pressure



Specifications for this tank—designed to operate from vacuum to 25 pounds' pressure—called for welded 2S aluminum. This, as welders know, could cause problems. But the builders called on radiography. Here is what they say:

"X-rays played a very important part in the extensive research to determine the most suitable method of welding the vessel. Without the use of x-ray we might never have obtained the high quality and uniform results."

Which shows two important facts. First, that radiography proves the soundness of welds. Second, that it expands the use of the welding process.

This is good reason that today more and more welders make use of radiography. If you would like to know how it can help your business, get in touch with your x-ray dealer and talk it over.

EASTMAN KODAK COMPANY
X-ray Division, Rochester 4, N. Y.

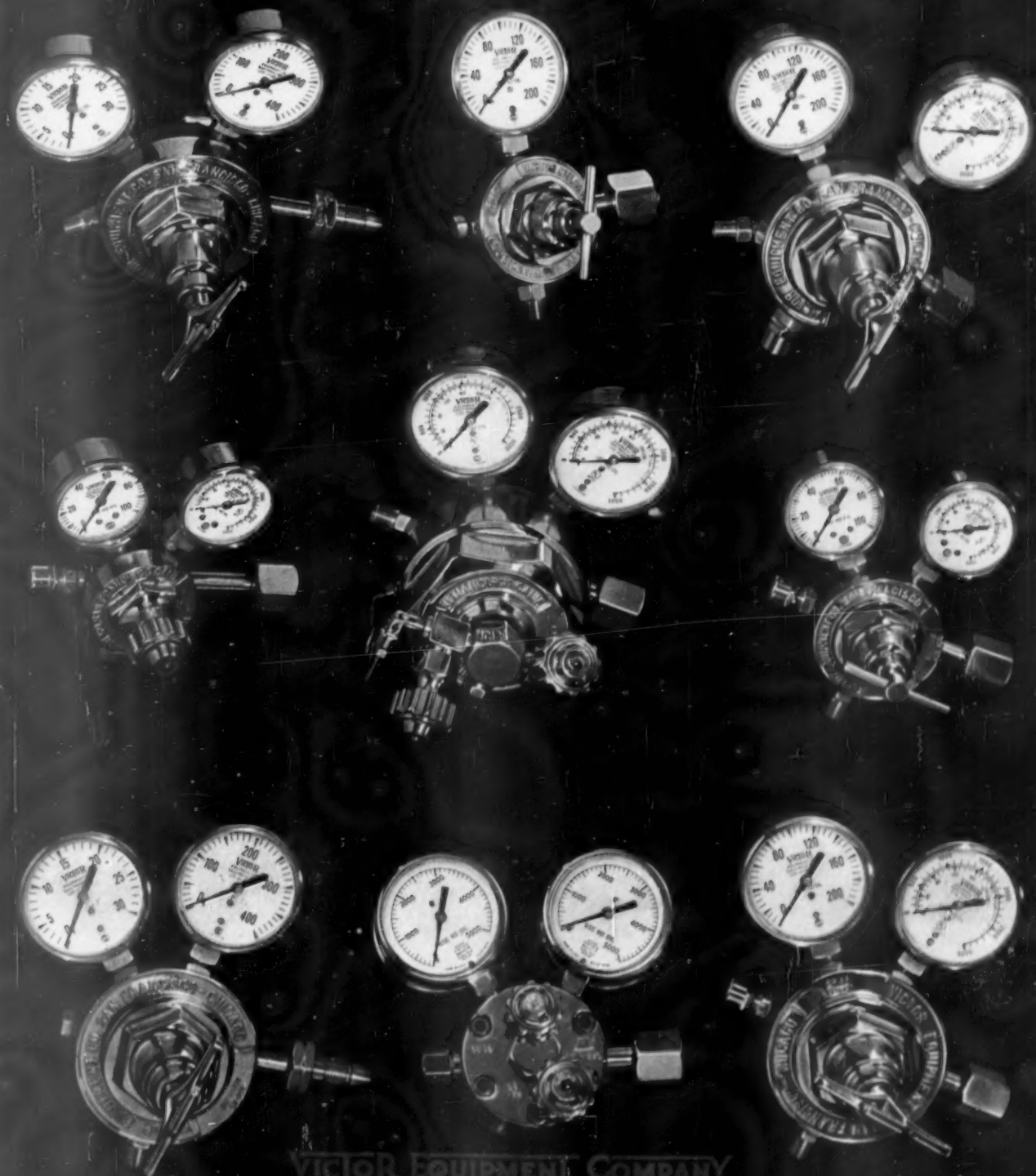
Radiography . . .
another important example of Photography at Work

Kodak

VICTOR REGULATORS

For accurate and dependable pressure control

Up to 10,000 p.s.i. and Over on Special Order



VICTOR EQUIPMENT COMPANY

Makers of welding & cutting equipment ... Flame hardening ... Flame blasting fixtures

844 Folsom Street

Eye Protection

Fits Over Practically All Personal Glasses— Comfortably!

For welders who wear prescription glasses, the new AO 625 Headrest Goggle has what it takes in comfort, convenience, and protection against dangerous light radiations, glare, flying sparks and scale. Perfectly balanced, there is no overhanging weight — even in "off-guard" position. NOTE THE NEW "327A" LARGE COVERGLAS DESIGN WHICH GIVES UP TO 20% MORE ALL AROUND VISION THAN COMPARABLE GOGGLES. Your nearest AO Safety Products Representative can supply you.

Quick Facts

- Thumb screws permit quick adjustment to facial contours and proper pupillary distance. Spring mechanism throws goggle into "off-guard" instantly.
- Fibre headgear fits snugly. Adjusted by nut turning on right and left hand threaded stud.
- Opaque eyecups fit closely, won't conduct heat. Especially designed for wear over personal glasses.
- Side shields are light-tight, provide indirect ventilation.
- Noviweld or Filterweld lenses, shades 3, 4, 5, 6, or 8. Easily replaceable cover lenses protect filter lenses from pitting or scratching. Please specify type of lens and shade number desired.

†T.M. Reg. by American Optical Company

American Optical
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

NOW! a new safety concept in grinding wheels—

FOR PORTABLE GRINDERS

COLONIAL WHEELS . . . Equipped with GRINDAWAY* Safety Rings . . . PROVIDE AN INCREASED SAFETY FACTOR!

Increased safety in grinding wheels is now available! Colonial reinforced resinoid wheels for high speed, portable grinding are equipped with the revolutionary GRINDAWAY safety rings to provide greater safety at no sacrifice in grinding quality!

Made of a material having greater tensile strength than steel, Colonial GRINDAWAY safety rings can be inserted in the wheels where reinforcement is most needed . . . *in the actual grinding portion of the wheel.* This is possible since they abrade away as the wheel wears through them. Such reinforcement in the actual grinding portion of the wheel has never before been possible.

Colonial Abrasive Products Company offers GRINDAWAY safety rings in three types: straight, recessed, and flaring cups with grinding quality maintained in each and without premium cost.

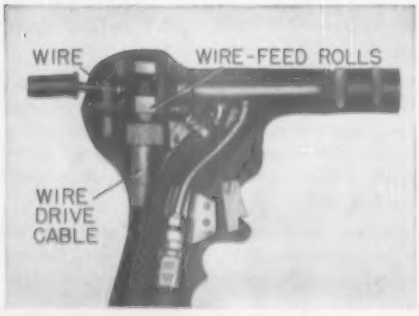
New literature is available describing the construction, advantages, and prices of each type Colonial GRINDAWAY wheel. We invite you to write for your copy today.

**PATENT APPLIED FOR*

COLONIAL ABRASIVE PRODUCTS CO.
SIXTH AND HARRY STREETS
CONSHOHOCKEN PENNSYLVANIA

WELDING ARCS NEWS

WHY G-E FILLERARC EQUIPMENT GIVES YOU MORE APPLICATIONS FOR YOUR INVESTMENT



WIDE RANGE OF WIRE SIZES—.020 to .093—are accommodated by the Fillerarc gun. Gun accepts even smallest diameter wires because it feeds wire by *pulling*—prevents kinking.

HIGH WIRE-FEED SPEEDS—up to 1000 in./mt.—are realized with Fillerarc wire drive—making possible a wide range of applications.

G-E high-speed Fillerarc process solves mild-steel problem at Lukenweld; holds correct arc length automatically, to eliminate burn-back and stubbing

Fillerarc is General Electric's equipment for consumable-electrode, gas-shielded welding. It is semi-automatic and includes a self-regulating generator, a hand gun, and a wire-drive unit which delivers wire-feed speeds up to 1000 inches per minute. Fillerarc equipment has been successfully used on aluminum, aluminum bronze, stainless steel, copper, magnesium, titanium, nickel—and recently—mild steel.

LUKENWELD DIVISION of Lukens Steel, Coatesville, Pa., recently began using Fillerarc equipment to weld mild-steel compressor cases. According to John L. Lang, Welding Engineer for Lukenweld, Fillerarc equipment was chosen over the submerged melt process for two main reasons: easy control of the arc and the absence of flux. (Flux can be damaging to compressor components.) Welds were of sound quality, without undercutting. Compressor cases passed 150-lb pressure tests and snifter tests.

REDUCED BURN-BACK and stubbing are natural benefits of the Fillerarc generator . . . proved at Lukenweld:

Lukenweld—to meet special production requirements—fixed the Fillerarc hand gun in a mount over a revolving positioner. This positioner held the compressor case. Now, since the gun was fixed, arc length had to remain constant. Otherwise, sudden shortening of the arc could cause stubbing —or a sudden lengthening could cause burn-back to the gun. In either case, time would be lost and the weld damaged.

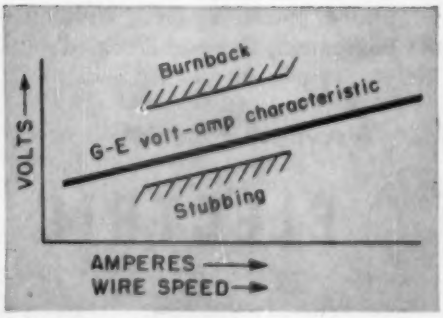
The Fillerarc generator automatically held the desired arc length—regardless of adjustments in wire-feed speed. Burn-back and stubbing were avoided.

THIS IS PROOF that an operator handling the gun *manually* doesn't have to manipulate it to compensate for arc length or go back to the generator to readjust arc length. He merely sets the voltage and wire-feed speed, and aims the gun. The Fillerarc generator does the rest.

For details on the versatility of G-E Fillerarc equipment, see the story below. General Electric Co., Schenectady, N. Y.

FOR FREE BULLETIN—SEND COUPON ON NEXT PAGE

G-E SELF-REGULATING GENERATOR is the only power source specially designed for this process. Insures proper current for any wire speed.

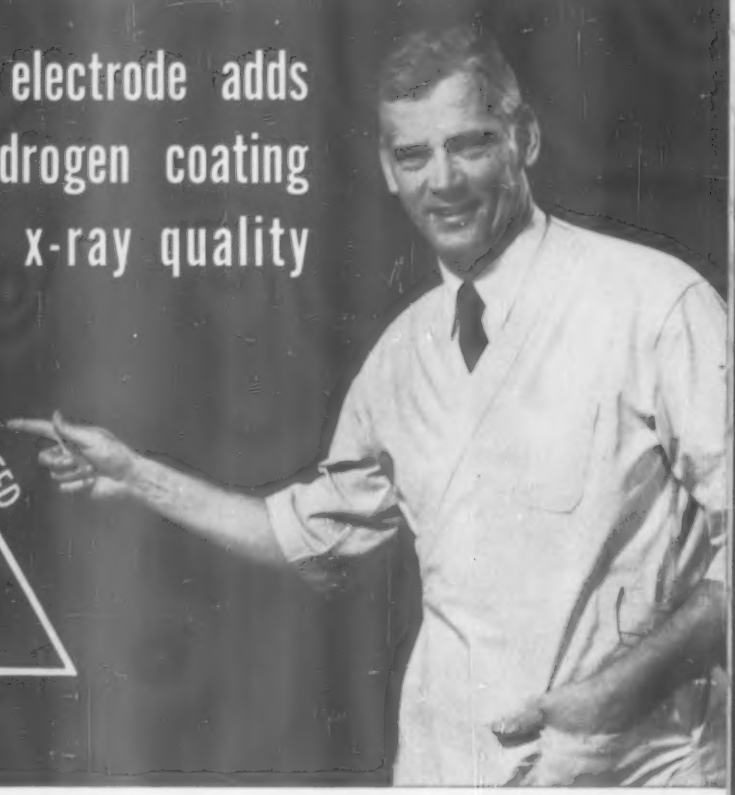


RISING VOLT-AMP CURVE of the exclusive G-E Fillerarc generator matches arc curves . . . does not get into burn-back and stubbing areas. Resulting high weld quality is uniform.

REMOTE CONTROL of wire-feed speed permits the operator to control burn-off rate and current without returning to the generator.

GENERAL ELECTRIC

NEW G-E Strikeasy LH-1 electrode adds metal powder to low-hydrogen coating for speed, ease-of-use, x-ray quality



Consider the payoff qualities you want in an electrode as representing the three sides of a triangle: speed, ease-of-use, and x-ray quality. Frequently, an electrode which is fast and easy to use does not deliver the highest quality—and vice versa. So, the triangle has unequal sides.

Now, with General Electric's new Strikeasy LH-1 electrode, you get the closest approach yet to the perfect triangle, the perfect electrode. You get the quality you expect from low-hydrogen electrodes plus the speed and ease of use that have given powdered-metal electrodes wide acclaim.

And Strikeasy LH-1 electrode speeds deposition rates up to 61% over conventional E-6016 electrodes—by actual test.

For more information on G-E Strikeasy LH-1 electrode, send the coupon shown below.

Your G-E welding distributor is located near you for fast local service. Ask him about G-E Fillerarc equipment and Strikeasy LH-1 electrode. His name is listed in the yellow pages of your phone book under "Welding Equipment, General Electric."

Progress Is Our Most Important Product

GENERAL ELECTRIC

X-RAY QUALITY is inherent to the low-hydrogen coating. Bad spots in base metal are absent from the weld.

G-E STRIKEASY LH-1 ELECTRODE	6.58 Lb Per Hr	
CONVENTIONAL E-6016	4.08 Lb Per Hr	INCREASE OF 61 %

($\frac{3}{16}$" electrodes used in test)

HIGH SPEED of Strikeasy LH-1 is due to metal powder. (Optimum current, ac: Strikeasy, 300 amp; E-6016, 225 amp.)

DRAG TECHNIQUE natural to powdered-metal electrodes speeds deposition, training. Slag is almost self-removing.

Section A710-21, General Electric Co., Schenectady, N. Y.

Please send me the bulletins checked below:

- ☐ GEA-6028 and GER-903—Fillerarc Equipment
- ☐ GED-2483 and GEC-1231—Strikeasy Electrode

NAME.....

TITLE..... COMPANY.....

STREET.....

CITY..... STATE.....

ESTABLISHED 1916

Welding Engineer

JANUARY, 1955

ANNOUNCEMENT . . .

THIS year marks the beginning of the fortieth year of publication of WELDING ENGINEER, the world's oldest and largest paid circulation welding publication. In January, 1916, a new business paper came into being—WELDING ENGINEER began publication. The publisher, L. B. MacKenzie, was a man of vision with faith in the future of welding.

L. B. MacKenzie was indeed courageous when he chose to bet on the future of welding. It could hardly be classed as even a maintenance process. Mac's faith in the future of welding has been justified, and, though he did not live to see it, welding has become an important part of the production processes of American industry.

Since "Mac" founded WELDING ENGINEER in 1916, it has had two owners: Welding Engineer Publishing Company and McGraw-Hill Publishing Company, Inc. Effective January 1, 1955, namely the February issue, it becomes the property of Welding Engineer Publications, Inc., 12 East Grand Avenue, Chicago 11, Illinois, with T. B. Jefferson as publisher and editor.

Ted Jefferson is well known to the readers of WELDING ENGINEER and to the welding industry as a whole. For nearly thirty years, he has been a part of the welding industry as a weldor, superintendent and engineer. For nearly fifteen years, Ted has been editor of WELDING ENGINEER and is recognized as an outstanding authority on welding. During these fifteen years, welding has enjoyed its greatest growth.

Ted Jefferson knows welding and the welding industry; he also knows publishing. As head of the new publishing company he will be in a position to combine these skills for the benefit of WELDING ENGINEER readers and advertisers.

The new publisher of WELDING ENGINEER is looking ahead to even greater use of welding, for he is firmly convinced that the greatest possibilities for welding lie ahead. Just as WELDING ENGINEER has led the "parade of welding progress" in the past, so will it continue to lead it in the future.

WELDING ENGINEER's editorial policy will be the same as in the past—to bring the best of welding information and news to its readers. Always first in editorial quality, WELDING ENGINEER, with an adequate and highly trained editorial staff, will retain this leadership.

Last, and very important, WELDING ENGINEER will continue as a paid circulation ABC-ABP publication as it has been since its beginning.

We know that the future for welding will be great and ever-expanding. The future of WELDING ENGINEER will be assured if it continues to merit and receive the loyal support readers and advertisers have given in the past. The new publisher pledges all his efforts toward an ever-expanding publishing service to the welding industry.

McGraw-Hill Publishing Co., Inc. • Welding Engineer Publications, Inc.

Made to Last by Hard-Facing

19 LIVES FOR CONCRETE MIXER BLADES

Concrete mixer blades hard-faced with HAYSTELLITE tungsten carbide rod have 19 times the life of unprotected cast steel blades. The hard-faced blades, used in making concrete blocks, now give 20 months of tough service operating 24 hours a day, six days a week. Unprotected blades had to be replaced every four to five weeks.

NO MORE MONTHLY MAINTENANCE

This mud gun screw lasts for 8 to 10 months after being hard-faced with HAYNES STELLITE alloy No. 1. A single application of HAYNES STELLITE hard-facing rod eliminates at least seven shutdowns for repair. The screws previously had to be built up every month with steel rod because of severe wear on the flights.

DOUBLES THE LIFE OF DITCHER TEETH

Hard-faced teeth on ditching machines last from two to three times longer than unprotected ones. Hard-facing with HAYSTELLITE tube rod gives the teeth the added abrasion resistance needed to tear through clay, sand, shale, sandstone, rocks, and fragments of paving material. It takes only 40 seconds per tooth to apply the rod on this special jig.

Hard-facing can solve many of your maintenance problems. For more information, contact the nearest Haynes Stellite Company office.

"Haynes," "Haystellite," and "Haynes Stellite" are trade-marks of Union Carbide and Carbon Corporation.

HAYNES *alloys*
Trade-Mark

Hard-facing products made from cobalt-base alloys, nickel-base alloys, iron-base alloys, and tungsten carbide, in the form of rod, wire, and coils.

Haynes Stellite Company
A Division of
Union Carbide and Carbon Corporation
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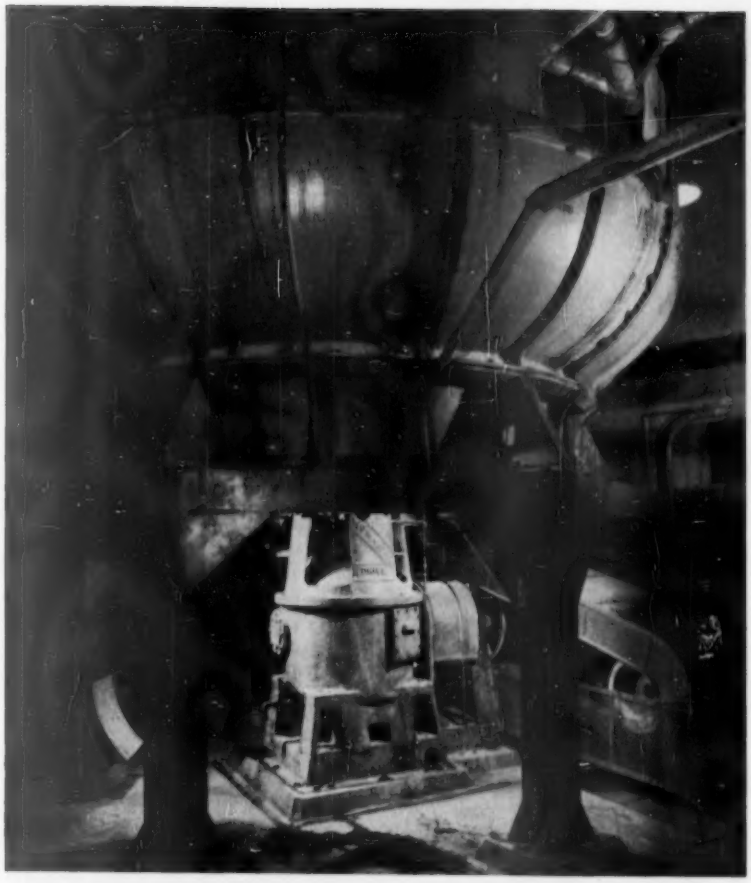
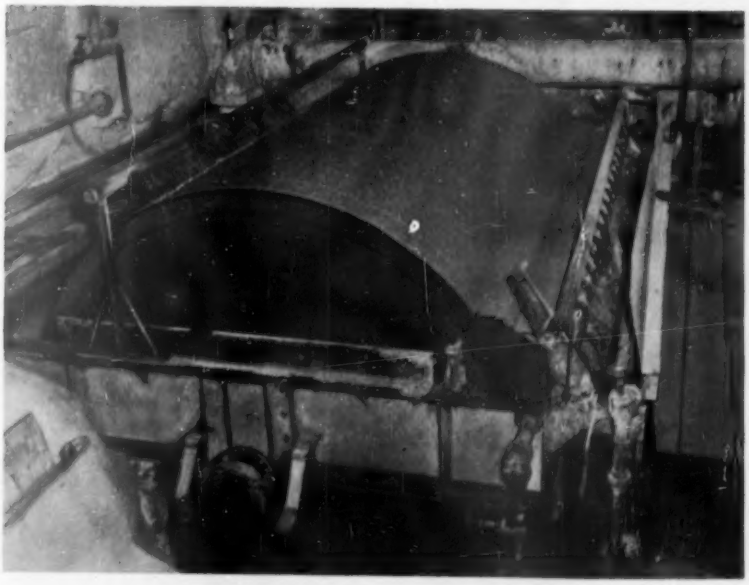


FROM paper to pulp and pulp to paper is the cycle at the modern and model mill at Newton Falls, N. Y. Large machine in top picture is called a "hydrapulper." Its purpose is to grind up old paper stock and digest it with chemicals to convert it into a fluid pulp. The vanes of the hydrapulper wear down considerably during a year, must be built up periodically with cobalt-chromium-tungsten alloy

. . . paper to pulp



. . . pulp to paper

PULP or "stock" is pumped to washing and refining plant in the bottom picture. Recently this plant was completely rebuilt in order to double the amount of riffling, screening and washing given each batch of stock. In this major rebuilding job, welding was allotted an extremely important role in the fabrication of stainless-steel vats and large-diameter piping

BY CLYDE B. CLASON

NESTLING in the pine forests of the Western Adirondacks is a little village of 175 dwellings, two apartments, two churches, a few stores, a recreation center and a postoffice. This is Newton Falls, N. Y., noteworthy for being the site of a paper mill that has been widely acclaimed in paper trade journals as "the mill of tomorrow."

As long ago as the second century before Christ, the art of making paper from fibrous material was known to the Chinese. Until 1798, when the first paper machine was invented by Louis Robert of the Essone Paper Mills in France, paper was made by hand. From the wet felt, the papermaker had to laboriously beat out one sheet at a time.

At Newton Falls nothing is made by hand. Ingenious engineering has brought the art of papermaking to so high a degree of mechanization that virtually all manual labor has been eliminated. The plant produces "precision engineered paper," and about all that its 330 employees have to do is to set gages, watch dials and keep the various machines running the way they should.

Keeping many large and highly complex machines up to snuff, however, is by no means an easy task. Furthermore, it is necessary for the plant engineer to face the geographical fact that Newton Falls is 65 miles away from the nearest large community. Obviously, outside talent cannot be requisitioned when trouble

is encountered. The mill must stand entirely on its own . . . take care of its own problems as they come up and effect its own repairs. And thanks to Plant Engineer Arthur C. Smith and his staff, it is able to function as a wholly self-reliant organization.

A carefully planned program of preventive maintenance is the key to trouble-free operation, declares Mr. Smith. Back of this program is one dominant aim: to avoid all unplanned shutdowns. Since all departments of the mill are interlocked and dependent upon each other for a smooth production flow, any delay in repairing damage to one small machine part could very easily force a shutdown of the entire mill. It is the business of Mr. Smith and his capable assistants to see that it never happens.

Welding is indispensable to their many activities.

The company has one full-time weldor, Robert Crary, who is kept as busy as the proverbial one-armed paper hanger. Mr. Crary, however, is given plenty of equipment. He has at his disposal a 200-amp transformer-type a-c arc welder, a 300-amp d-c motor-generator welder and three complete gas welding and cutting outfits. The latter are located at strategic points throughout the mill where they will be handy for possible emergencies. There is also a lead-burning outfit and complete metallizing equipment.

Weldor Crary's duties fall under three main heads: (1) preventive maintenance, (2) emergency repairs and (3) fabrication. Let's have a better look at each of these.

1. Preventive maintenance

A good example of what must be done to keep papermaking machinery in A-1 operating condition is offered by the hydrapulper. Each bale of waste paper, from which the new stock is made, is loaded into the hydrapulper to be converted into a fluid pulp. The hydrapulper has a capacity of 6,000 lb of pulp at 6% density. Its beating heart is a 7-ton rotor, approximately 6 ft in diameter.

The rotor is fitted with vanes, which work with stationary vanes in the walls of the tubular chamber. Both rotor vanes and stationary vanes wear down appreciably in the course of a year and must be built up with hardfacing. The rotor vanes require the deposition of about 25 lb of a cobalt-chromium-tungsten hardfacing alloy, the stationary vanes an equal amount. The job is done as the need for it is determined from periodic inspection of the hydrapulper's interior.

Blades of induced draft fans are similarly hardfaced at regular intervals. A cobalt-chromium-tungsten alloy is again used, although one of a different type from the alloy deposited on the hydrapulper blades.

Motor shafts and their bearings are continually kept up to standard by means of a metallizing treatment. "Nothing in a plant is more aggravating than mongrel shafts or bearings," declared Mr. Smith. An undersize shaft is prepared for metallizing by means of rough threading in a lathe (a knurling preparation is used to roughen the surfaces of small shafts). Still in the lathe, the shaft is sprayed oversize with mild steel and machined to accurate dimensions.

Shafts for papermaking machinery sometimes run rather large. An example is provided by the shafts of winder machines, which are about 3½ in. in diameter and 10 ft long. Here only the journal areas are sprayed—a section of about 6 in. long at each end of the shaft. The antifriction bearing of winders are not metallized but are bored and poured with Babbitt metal.

The boiler plant must also undergo regular preventive maintenance. Boiler tubes are inspected regularly and any defective sections found are cut out by flame-cutting and replaced by new tubes that are torch welded into place. Thus trouble is avoided before it gets a chance to start.

Leaks in steel pipe are sometimes welded, but only as a temporary measure. Usually, a pipe is ready for replacement by the time it has begun to leak, says Mr. Smith.

2. Emergency repairs

Emergencies do not occur often in this well-looked-after plant. When a part does break, it is generally a cast-iron frame. Broken castings are repaired by braze welding with the oxyacetylene torch. Here is the general procedure:

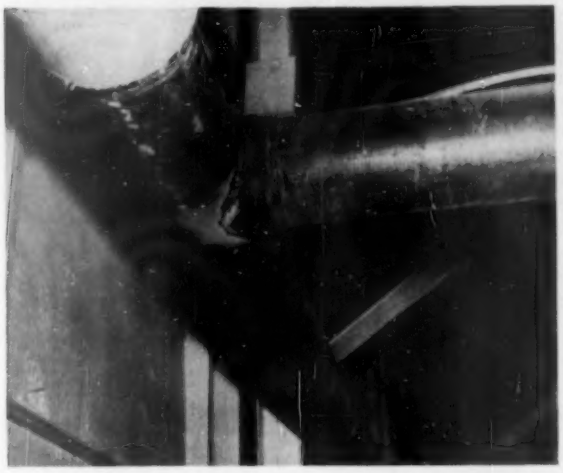
The edges of the break are chipped to a vee, and the casting is preheated by means of a propane torch to a temperature of 1,400-1,600 F. If the casting is too large for torch preheat, it is heated on a forge. Sometimes the repair must be made with the casting "in position," in which case as large an area as possible is preheated around the break, and the weldor keeps his fingers crossed.

A low-melting-point bronze rod is employed. After braze welding, the casting is stress relieved by torch or forge to a temperature of 1,200-1,400 F and is then placed in a box of lime to cool slowly. It's stress relieving that is the secret of a successful braze weld, thinks Mr. Smith. Rarely, he has noticed, does a braze-welded repair fail in the weld. When failure does occur, it is at the side of the weld and can generally be attributed to inadequate relief of the locked-up thermal stresses. Over 90% of the company's braze-welded repairs, however, do not fail—in the weld or outside.

It is impossible to overemphasize the value of braze welding to this isolated paper mill. Many repairs can be made in less time than it would take to drive to Watertown and back to get a spare part. However, spare castings cannot very often be procured at a minute's notice. Usually, weeks are needed to secure replacement—months, perhaps, if the machine has been declared obsolete or the manufacturer has gone out of business. In such cases, a new casting can be secured only by designing and making a new pattern—a costly and time-consuming business.

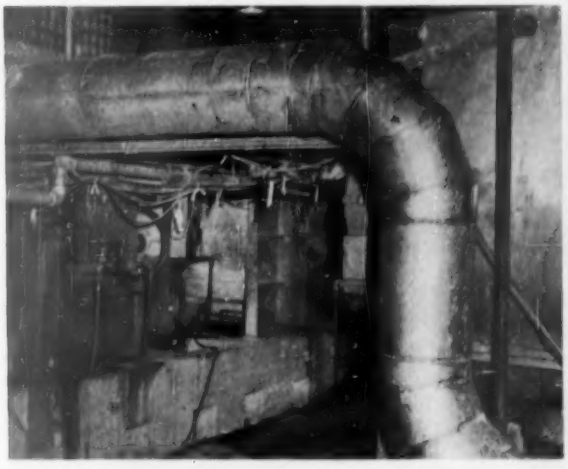
When an obsolete casting has to be replaced, the Newton Falls mill usually avoids pattern costs by fabricating the part of welded steel. Such a fabricated part may not look like the casting it replaces, but it will do the job just as well. And it will be ready for service in a day or so. Besides its ready availability, the other big advantage of weld-fabricated part is the much greater latitude that is allowed in design.

Let's look at a few examples of successful braze-welded repairs. There is in the paper mill a large finishing machine consisting mainly of a series of rolls, purpose of which is to cause the paper to become smooth and glazed. This is known as a super calender. Once the frame on one roll stand of

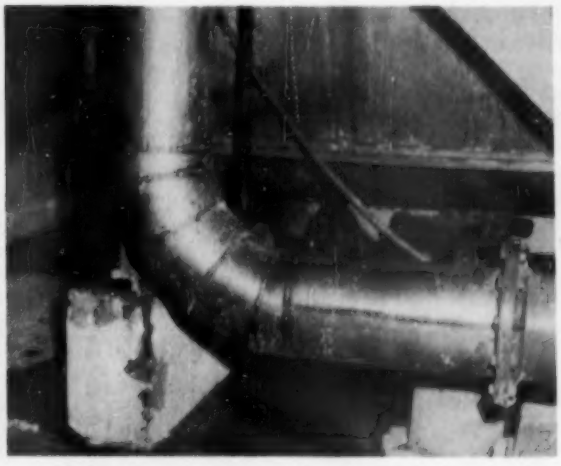


HOW a welding fitting was used to take off a branch from 8-in. exhaust steam line to paper machine driers

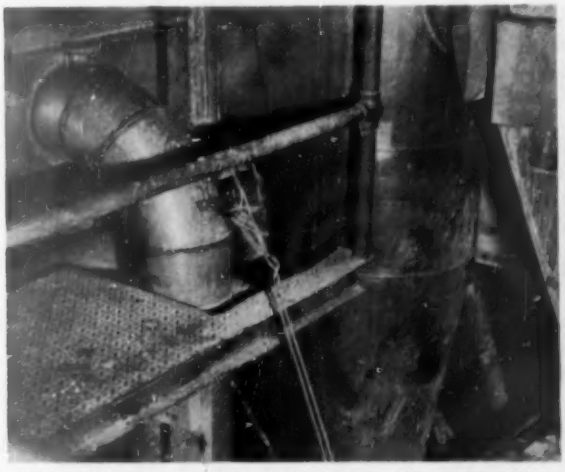
LAUNDERING of inky pulp requires lots of stainless piping. This 12-in. line runs from screens to washers



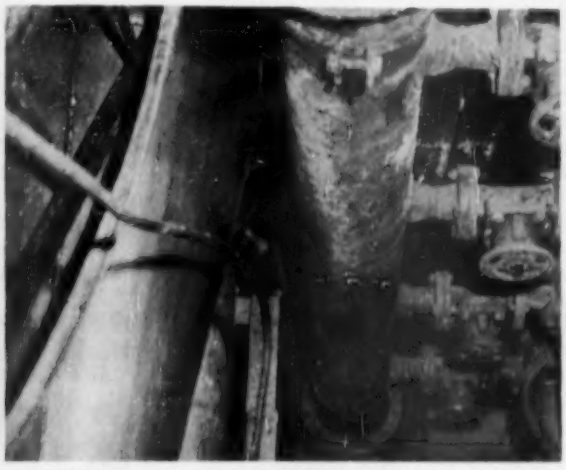
IT WAS welding all the way when constructing this 12-in. stainless line from washer to stock regulator



PLANT weldor fabricated this 90-deg ell from stainless piping—pipeline is same one pictured on the left



PIN TRAP removes all foreign matter from the pulp before allowing it to enter screens. In right picture . . .



TO RIGHT of pin trap is 12-in. header for centrifugal cleaners. The 4-in. nipples were all welded on

ARM for supporting roll bearings on coating winder broke off. It was braze welded, as you can see here

PREVENTIVE maintenance: bearings of winder shafts are restored to their original size after metallizing

the super calendar broke and stopped the operation of the entire machine.

The broken frame consisted of a right angle 3 by 4 ft connected to a web 5 in. wide by ¾ in. thick to form a roughly triangular section. The break started at the corner of the right angle and continued all the way through the web, dividing the triangular frame into two smaller triangles. The frame was repaired by braze welding, following the procedure just described. Some 25 to 30 lb of bronze rod had to be deposited, and the job took about six hours to complete. The welded repair has now lasted for three years, and the frame seems likely to continue in service indefinitely.

Process steam is vital to many phases of papermaking, including the drying of the wet paper. Such steam is supplied to the drier rolls from a boiler heated by an integral furnace fired by pulverized coal. The pulverizer is a ball-type mill. It is supposed to be guarded by a magnet to prevent the entry of "tramp iron" but, unfortunately, a piece of tramp iron once got past the magnet. The impact shock broke both lugs on the main casting of the gear housing, stopping the pulverizer from operating.

A shutdown of the entire mill could have occurred within a few hours as the steam supply failed. There was no duplicate casting in stock, nor was one available from the manufacturer. Fortunately, the welding department was right on the job.

The broken lugs each measured 6 by 3 in. with a 6-in. web. To avoid dismantling the machine and thus losing precious time, they were oxyacetylene braze welded "in position." After the bracket had been brought up to proper preheat temperature, a helper held the temperature with a preheat torch while the weldor deposited the bronze filler metal. About 20 lb of bronze were consumed, and the whole job was done in record time. The steam supply did not fail, and a mill shut-down was avoided. So satisfactory has this welded repair been that a new casting has never been ordered.

A similar repair was made on the "hold-down" arm of the coating machine. This arm is a large T-shaped casting, 24 in. long by 30 in. high with an 8 by ½ in. web. It was taken out of the machine, preheated, braze welded with the oxyacetylene torch, stress relieved and then allowed to cool in lime for 24 hours. The repaired casting has now given more than two years of satisfactory service.

One type of part that is not repaired by welding or braze welding, except in a dire emergency, is a broken shaft. A shaft can never be welded successfully, says Mr. Smith, if it is to be afterwards stressed near its capacity. When so stressed, the welded shaft will break again (invariably besides the first weld) because of locked-in thermal stresses.

3. Fabrication

Emergency repair jobs occur rarely, and the preventive maintenance jobs, although important, do not take up the bulk of the plant weldor's time. Most of his time is spent in original fabrication. Walking on a guided tour through the mill, the visitor can't help but be impressed by the number of different things that have been made by welding—ranging in size from enormous tanks and vats down to a simple welded ladder. Wherever new equipment has to be added, as is being done constantly, the weldor is called in to fabricate some of the needed auxiliaries.

It should be mentioned, perhaps, that the weldor does nothing but weld. Others plan the job and assemble the parts before the weldor is called in to finish the job with his torch or electrode. Nevertheless, the plant weldor is kept plenty busy, and he has to be a resourceful individual, able to weld practically any kind of material under any kind of circumstances.

Occasionally, new buildings or new additions are required, and these usually have welded steel frameworks. Clips are shop welded onto the beams and columns to facilitate erection of the steel. This is a job for the plant weldor, who also fabricates ladders, stairways, pipe guard rails around machinery and stairs and runways of steel grating. Expanded metal is used for runways and stair treads where the going is likely to be slippery.

Pipe Fabrication

By far the biggest job that the weldor has to do is on pipeline construction. The paper company uses a large amount of stainless-steel piping, in diameters ranging from 6 to 14 in., and has found that a substantial saving can be made by fabricating its own pipe and pipe fittings. As a specific example, an 8-in.-diameter

stainless-steel pipe would cost $27 per foot, delivered at Newton Falls, but can be fabricated in the mill for $8 or $9 per foot, including both labor and materials.

The raw material for stainless pipe fabrication is type 316 or type 304 stainless, mostly 11-gage sheet. The sheets are purchased in 4 by 10 ft sizes and are cut to size for the particular diameter desired on a rotary shear. Cutting and pipe bending are both done by a steel fabricating concern in Watertown, 65 miles away. The rolled pipe blanks are trucked to Newton Falls in 2-ft lengths and welded as they are required or as a spare-time job for the plant weldor. He welds the longitudinal seam to complete the tube section and then joins the sections together with circumferential welds. Both types of weld are made by manual arc welding, using coated stainless electrodes.

The company makes its own fittings by cutting stainless-steel pipe sections. The desired angle is scribed on the pipe with a special drafting tool, and the pipe is then cut with an abrasive cut-off wheel 7 in. in diameter. Tees, elbows and other joints that can be developed by geometrical projection are fabricated in this manner, but not fittings that require hammering or forging such as nozzles or reducers.

With carbon-steel pipelines, most of the pipe and pipe fittings are purchased. Welding fittings have been used for a number of years, and their use is being progressively extended as threaded or flanged piping is replaced by welded pipelines. The trend is certainly in the direction of the all-welded pipe line, and eventually there will be little, if any, threaded pipe left in the mill.

Joints Can't Leak

The trouble with threaded pipe, says Mr. Smith, is that too much metal must be removed in order to produce the threads. This weakens the pipe, and eventually there will be leaks and failure. Most pipe failures occur at threaded joints, which are certainly the source of leaks also. A welded pipeline is free from leaks throughout its life, barring unforeseen circumstances.

If an addition to a welded pipeline is desired, or a corroded section must be replaced, it is as easy for a weldor to do the job with a torch as for a pipe-fitter to do it with his cutting tools and wrenches. Furthermore, it is no trick at all to weld in the proper type of welding fitting whenever you want to tap a welded pipeline. Altogether, Mr. Smith has a high regard for the usefulness of welding fittings.

When one says "paper mill" the picture that jumps most readily to mind is of an enormous pile of logs waiting to be sliced up and ground into pulp. At Newton Falls, there is no such log pile because no ground wood is used in papermaking here. About 60% of the pulp stock comes from old paper and the remaining 40% is virgin pulp, imported from nearby Canada.

How Paper Is Made

The old paper is carefully selected. No newsprint is used and little magazine paper. Ledger stock, both white and colored, is preferred for the high-quality paper that is turned out in this mill. The old paper, no matter what its nature, is carefully sorted and graded for segregated storage from which it is drawn according to the specifications of the particular order.

The bales of graded stock are first loaded into the hydrapulper to undergo the treatment. Water at a temperature of 160 F and a caustic agent help the blades of the hydrapulper to complete the pulping process. The pulp is pumped into a large box called the "cooking chest," where it is heated from 1½ to 2 hours. The prolonged heat causes the chemical introduced in the hydrapulper to saponify the printer's ink, which must, of course, be entirely removed before a purified paper stock can be produced.

After cooking, the still dirty pulp is pumped into a storage chest, from which it is directed through the recently rebuilt refining plant to undergo such operations as riffling, screening and washing. Whereas stock of a "tattletale gray" flows in at one end of these gigantic laundry tubs, a snowy white pulp emerges at the other. All of the ink has been washed away.

After several more refining, washing and bleaching operations, the highly purified paper stock goes into the stock preparation room to be mixed with purchased virgin sulphite or sulphate pulp. Clay and binding resins are also added in a large vat, known as the blending chest. From the blending chest, the mixed stock goes through machines called "Jordans", which fray and flatten the individual fibers to control their length.

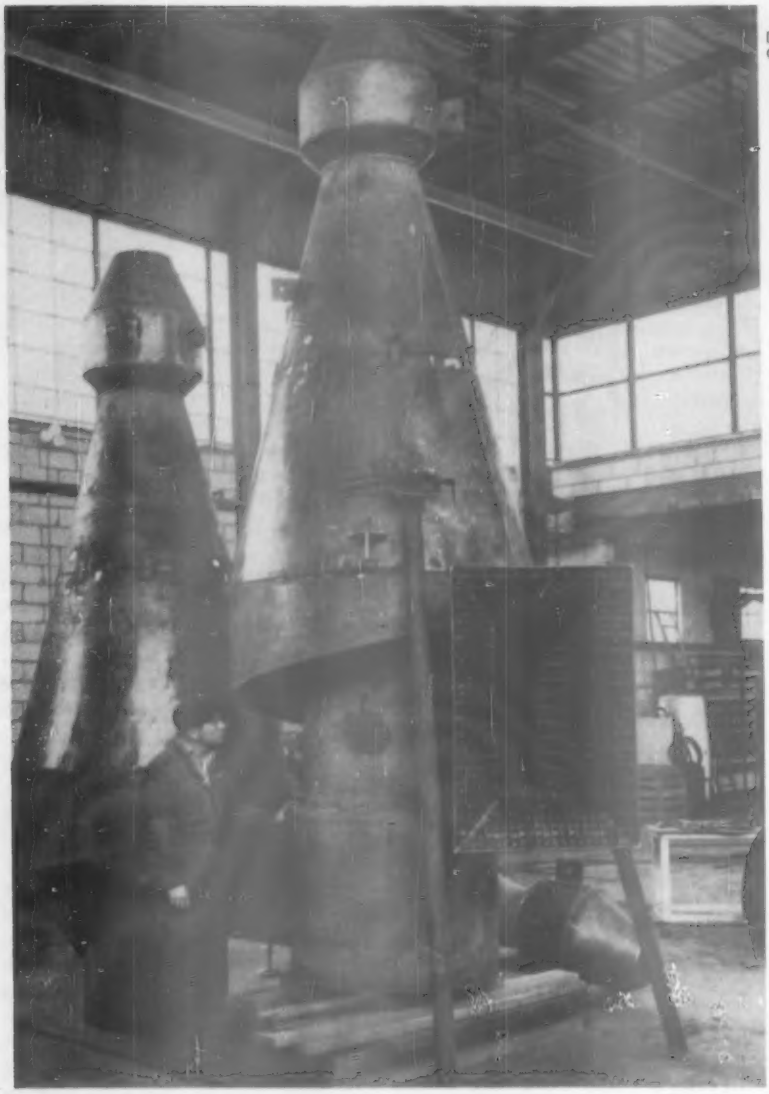
Leaving out several operations for the sake of simplicity, the fluid pulp flows into the "wet" end of one of the paper machines and onto machine wire, which evenly distributes the fibers and removes a portion of the water. Other operations too technical to be described here squeeze out most of the remaining water from the "web" as the sheet of gradually forming paper is now known. From the press section, the still damp web passes to the drier section. Temperature of the steam-heated drier rolls is carefully regulated so that the moisture content of the finished paper may be controlled to specification.

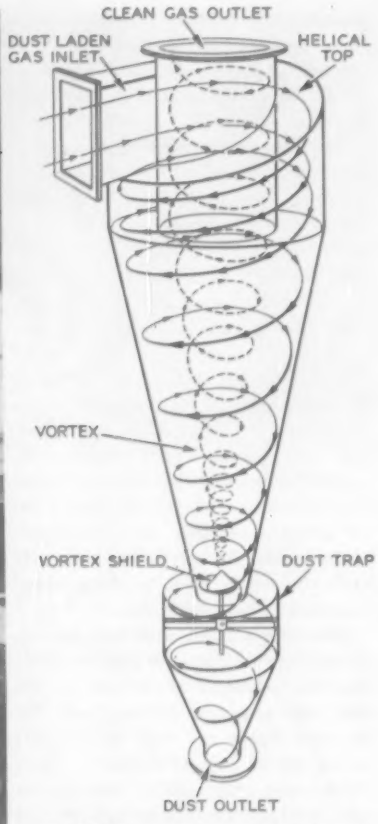
After the web has been allowed to leave the driers, it is forced through a set of machine calenders, which smooth and finish it. It is then wound on a reel and transferred to the machine winder, where it is either trimmed and/or cut into smaller rolls. From the machine winder, the individual rolls may or may not go to the coaters.

Magazine stock, such as Welding Engineer is printed on, is, of course, coated paper. The coating is a highly refined and pure-white clay. It is applied wet and then "planed off" by means of a wide, thin, high-velocity jet of air. A second drying operation is necessary after coating.

From the coating machine, the web is directed through a complex series of rolls, known collectively as the super calender. Through a combination of live steam, friction and pressure, the super calender causes the paper to become smoothed and glazed to any required degree of gloss. The best grade of paper for halftones is stock that has been super calendered.

Such are the highlights of the papermaking process at Newton Falls, and such are some of the many large machines that must be continually in operation. Failure of any machine, from the hydrapulper at the beginning of the process to the super calender near the end, would halt the flow and stop the output of paper. It is the purpose of Mr. Smith's preventive maintenance program to see that such failures are kept to the barest possible minimum. And his big job of maintenance would be immeasurably more difficult without welding to meet the emergencies as they occur and to keep wearing parts built up to their proper dimensions.





HELICAL roof deflects entering gas stream downward. At completion of the first convolution, the gas stream is parallel to and below the entering flow of dust-laden gas. Gradually increasing centrifugal motion of the gas stream causes the dust particles to adhere more closely to the wall of the cone as they descend downwardly to

VORTEX SHIELD at the bottom (apex) of the cone. This arrests the downward motion of the gas stream and starts the upward spiral of gas along the centerline of the collector. The dust particles, however, continue to descend along the wall of the cone, from which they are rapidly ejected into

DUST TRAP. Here all dust is received as rapidly as it is separated at the apex of the cone. The vortex shield prevents forming of a vortex in the dust trap itself and thus prevents unwanted turbulence that would carry dust back against the downward motion of the gas stream.

Welded cyclones assure smooth flow

The efficiency of dust collectors used in the towers of fluid-process catalytic cracking systems depends on perfect welding techniques as well as on good design.

BY HERMAN C. PHELPS

THE DUCON CO., Mineola, N. Y., manufactures dust collectors that are particularly well suited to the cracking process used in the production of high-octane gasoline. Their efficiency is due in part to simplicity of design but even more so to welded construction. Freedom from erosion and clogging is very important, and welded construction permits a high-speed, smooth, free flow for the spirally entering gas (see diagram). Frequently, these vessels are operated at temperatures between 900 and 1,100 F and at high pressures.

THEY'RE CALLED CYCLONES

Some refineries have batteries of as many as 52 "cyclones" in one vessel.

GRINDING all welds flush reduces chances of erosion or cavitation. Grinding also shows up bad welds

THERE'S nothing like proper positioning! Shop-built jigs allow for 15-deg-off-the-horizontal arc welding

The conical units are called cyclones because they operate on the same principle as Nature's twisters. Air or fluids are forced into the top and then spiraled downward at high speeds. Obviously, any raised surface would impair the flow of air or liquid so rivets are impossible, and all welds must be ground smooth.

Cyclones made by Ducon come in a wide range of capacities and in sheet thicknesses varying from 1/16 to 5/8 in. The steel used in their production is grade A 201 firebox steel, which has a tensile strength of 55,000 to 65,000 psi. The chemical analysis is: carbon 0.20-0.27%, manganese 0.80% maximum, silicon 0.15-0.30%.

After all plate is cut to size, the edges are ground smooth before they are formed and jigged. On the heaviest plates, butt welds are ground to a 37½-deg bevel, leaving a 1/8-in. root opening. Each section is tack welded together at 6-in. intervals. Before any seams are fully closed, however, all tack welds will be moved by grinding.

Welds are made in the flat position, 15 deg off the horizontal. E-6012 electrodes are used, 5/32 in. or 7/32 in., with machine settings at 150 and 175 amp, respectively. Welding is completed on the inside first. All welds must show 100% penetration, and no fisheyes, craters or porous welds are permitted.

Welds on the 14 ft 6 in. center seams are continuous. They are started at one point and continued from there completely around the vessel. Each butt joint has at least two passes, one each side. All weldors must pass the ASME qualification test.

Ducon supervisors discovered that a 201 firebox steel has a tendency to undercut or drop away at the corners or edges. Changing the amperage or changing the polarity did not eliminate the situation. However, the difficulty was solved by a welding supply salesman, Larry Roth, who happened to remember a similar circumstance on another job.

Roth suggested the use of straight *and* reverse polarity welds, one on top of the other. On the inside, the first pass, made by reverse polarity was capped with a deposit made by straight polarity. When the inside weld was completed, any metal that had penetrated to the outside was ground off. The first pass on the outside was then made with reverse polarity, and it was capped in the same way with a deposit of straight polarity.

Why does this eliminate undercutting? Nobody seemed to know the theory of it, but they all know that it works. If anyone knows why, please write us a letter.

Inspection is accomplished by trepanning. The inspector for the purchasing refinery marks a spot where he wants a 1-in. plug removed from a seam. Plug is cut out with a circular saw with a pilot (drill) in the center. The plug includes the entire weld section and enough of the adjacent parent metal to allow conclusions to be drawn regarding the degree of fusion. It is etched by boiling it in a hydrochloric acid bath for 15 or 20 minutes, sawed in two and re-etched. If the weld passes inspection, the hole is plugged up. If the inspector so desires, he can then call for inspection of the plug welds.

At the time of the writer's visit, the welding has been of such high quality, that only one of 61 plugs removed showed a flaw. In this particular instance, the weld in the trepanned plug revealed a crater crack, and a small section of the seam had to be removed. It developed that the crack was caused by a weldor's error in failing to overlap thoroughly when he welded back to the crater. This spot also had a slight inclusion.

* * *

The writer wishes to acknowledge the valuable assistance of Walter E. Palmer, welding specialist of Champion Rivet Co., and Larry Roth, owner, Allied Welding Supply, Elmont, Long Island, N. Y.

WELDED grid or floor steel is used to attach refractory material. Chalk-marked hole at right is where a trepanned plug was removed from a weld for inspection

NEWEST addition to the Harrison S. Martland Medical Center at Newark, N. J., is a . . .

Hospital designed for welding

BY HEATHCOTE W. LAWSON

Assistant Chief Engineer,
Schacht Steel Construction, Inc.

A SAVING of $113,000 is not to be sneezed at. It's a considerable pile of change in anyone's language. Yet that's the amount of money that was saved by the Newark General Hospital in switching from a riveted to an alternate welded design.

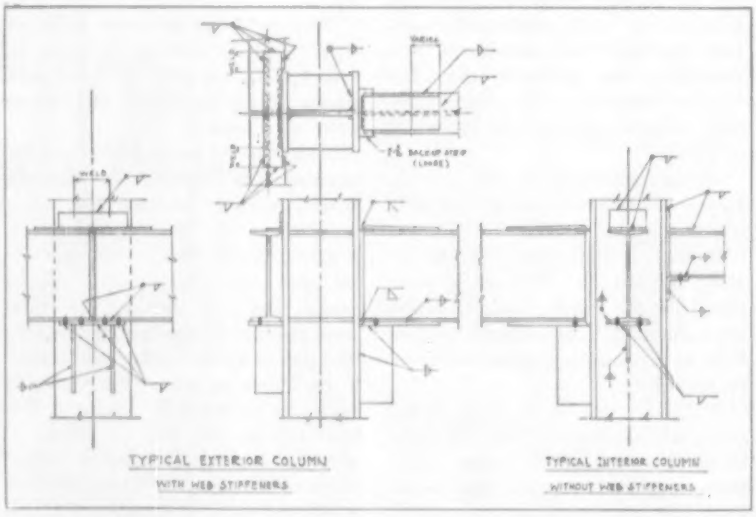
The hospital asked for bids on a riveted design but allowed an alternate bid to be submitted for welded connections designed by the fabricator. The successful bidder, Schacht Steel Construction, Inc., of New York City and Hillside, N. J., bid:

Riveted	Welded
$1,084,000	$971,000

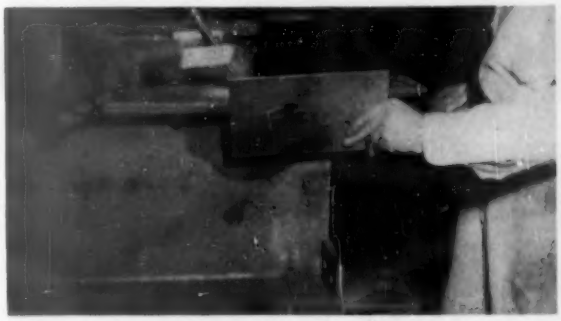
Simple subtraction shows where we get that $113,000 saving. It is only fair to state, however, that there was a lower riveted bid than that submitted by Schacht Steel. This was for $1,081,000, which reduces the saving from $113,000 to a mere $110,000. Never mind! Welding is still cheaper than riveting.

The welded steel frame saved 185 tons of steel over the original riveted design. Since no change in main material was permitted in the alternate bid, the entire saving was effected in detail material.

In size, the new building compares favorably with the largest hospital structures in cities of its class. The building is 98 by 290 ft at the base, with an 80 by 90 ft connecting wing at the rear to join the new building to an existing main building.



WELDED beam-to-column connections were standardized to produce a maximum of duplication in the shop. This meant a minimum of field welding



CARBON-ARC gouging tool removes a plate after welding

BLUEPRINTS tell the complete story to the shop weldor

WELDING on column. Note the clips for field bolting

WELDORS sat on I-beams, avoiding use of scaffolding

Above the fourth floor, the area is reduced to two 55 by 112 ft wings and a central tower 85 by 95 ft. The two wings rise to the 16th floor, while the tower extends one more floor to the roof.

Here is the recipe given by the successful bidder for eliminating costs in welded construction:

1. Obtain a high degree of standardization. This will
2. Save on drafting room costs by
3. Eliminating field sketches.

Achieve these musts and you have achieved lowered costs in fabrication and erection.

The reduction in price arrived at by the successful bidder was obtained after carefully designing welded column connections, standardized to a very high degree. The saving in weight of connections represents approximately 6% of the weight of the structure. Other savings, too, were accomplished by giving careful consideration to shop detailing costs and by the almost complete elimination of field sketches. The need for field sketches was eliminated by the careful attention to detail, which made it almost impossible to weld the connection in an improper manner.

For simple beam-framing connections, the field welding was the same for all connections. For wind connections, the butt weld on the top plate was self-indicating, while the weld against the lower plate was continuous on both sides of the beam, the size being indicated on the end of the connected beam. All field welds could be made while the weldor sat on the top flange of the beam; no falsework nor staging was necessary except for the extremely few special connections required by unusual structural demands.

The high degree of standardization also resulted in lower shop costs. Since the variety of fittings was reduced to a minimum, the variety of shop welds, too, was reduced to a minimum. Indicating the size by the piece marks of the connections also helped to lower costs.

Secondary beams were shop riveted and field bolted. Had the specifications ruled out the bolting of secondary members, these connections would also have been designed for welding. As it was, the shop work was balanced since the shop is equipped for riveted and welded fabrication.

All beams had to be punched for field bolting. The design details avoided holes in the main sections of the columns, where drilled holes would have been required at a considerable increase in cost over the punched holes used elsewhere.

It might be asked whether a reduction in costs by means of welded connections is obtained at a sacrifice in strength, durability or stiffness. Actually, welded wind-braced structures offer greater resistance to lateral forces than do similar riveted structures. Also, compact welded joints are more readily concealed in the fireproofing—and unsightly architectural treatment is not required to conceal bulky bracing connections.

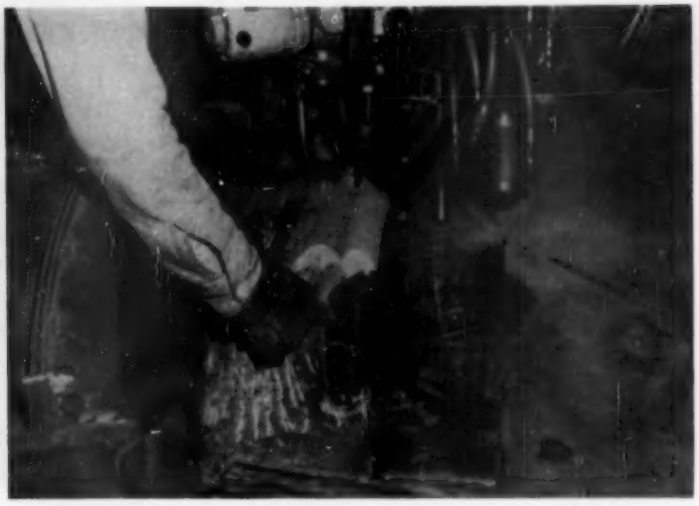
This analysis of a very interesting phase of steel fabricating operations indicates the economies that are possible where designer and detailer cooperate to obtain standardization.

The designer of this structure was Lars I. Moe, of Jersey City, N. J.; the architect, was Zeigler, Childs & Paulsen, also of Jersey City. The designer of the welded connections was Heathcote W. Lawson, consulting engineer specializing in welded structures, who is a member of the Schacht organization as assistant chief engineer. The shop detail drawings were prepared by J. Storch Associates, and the fabrication was by Schacht Steel Construction, Inc. The erector for Schacht Steel Construction, Inc. was Dan Klockner, Jr.

A WELDOR'S WOES

EVER NOTICE HOW EASY IT IS TO CLAMP A NEW HOLDER ON YOUR CABLE---
--AND THEN DISCOVER YOU FORGOT TO THREAD ON THE HANDLE?
FRANK TABOR
WELDOR'S EYE-VIEW THRU THE GOGGLES YOU LOANED TO THAT GREASY-FINGERED GENT.
WOULDN'T YA KNOW THEY'D PARK THE NEW ROD UNDER THE ONLY LEAK IN THE SHOP?
"HOW" DEPT.
THIS MONTH---LOCATING THAT ACETYLENE LEAK---
1
PACE UP AND DOWN, SNIFFING DEEPLY.
2
GET THE SCENT. FREEZE ON POINT LIKE A BIRD DOG
3
FOLLOW YOUR NOSE.
NICE TO KNOW ALL WELDORS ARE HAPPY. WE HAVEN'T HAD A GRIPE IN AGES.

1—CURVED track guides dual-head welding machine along the rim of giant blade



2—START of a pass. Leveling valve (at right of twin electrodes) actuates hydraulic jacks that keep the dual arc at a constant height

Big blades clad by series-arc

Critical areas of ten-ton turbine blades are protected from corrosion and wear by stainless layers deposited at high speed and low dilution.

IN PRODUCING turbine blades for the McNary hydro-electric plant in the Pacific Northwest, S. Morgan Smith Co., York, Pa., is facing the critical areas of each blade with a layer of stainless steel to provide protection against wear and corrosion. This is no small job, as each of these cast-steel turbine blades weighs about ten tons. Key to successful mechanized overlay is the use of two submerged-arc welding heads connected in series.

In series-arc welding, two electrodes are used. The current passes from one electrode to the other, and the workpiece is not connected into the circuit. As a result, almost all of the welding power is used to melt the cladding wire. Use of correct welding conditions assures a thorough bond, but without extensive melting of the base metal.

Because of their weight and shape, the big blades presented some special problems in positioning the workpiece and guiding the welding machine. A curved track (photo 1) guides the dual-head welding machine around the outer rim of the blade. Each weld is applied in one continuous pass from leading to trailing edge. Each succeeding bead is carefully overlapped, and cladding progresses outwardly toward the rim.

HEIGHT KEPT CONSTANT

The turbine blade is supported on three hydraulic jacks, which are controlled by leveling valves attached to the welding head. One of the valves is shown at the right of the dual nozzle in photo 2. As the welding head moves along, the curvature of the blade causes a change in level and height of the welding zone. Any movement of the leveling-valve follower actuates the hydraulic jacks, which automatically position the blade to return the welding zone to its proper level and height.

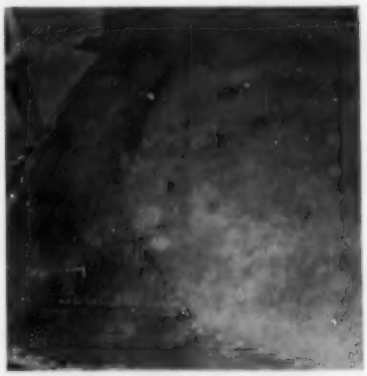
The surfaced portion of the completed blade is shown in photo 3. The tips of the blade, where the effects of cavitation and erosion are greatest, are protected with larger deposits. When straight welds are to be made along the leading and trailing edges of the blade, the machine is transferred to sections of straight track, which are quickly rolled into position.

After welding, the blades are machined, balanced and ground to mirror smoothness. They are then ready for shipment.

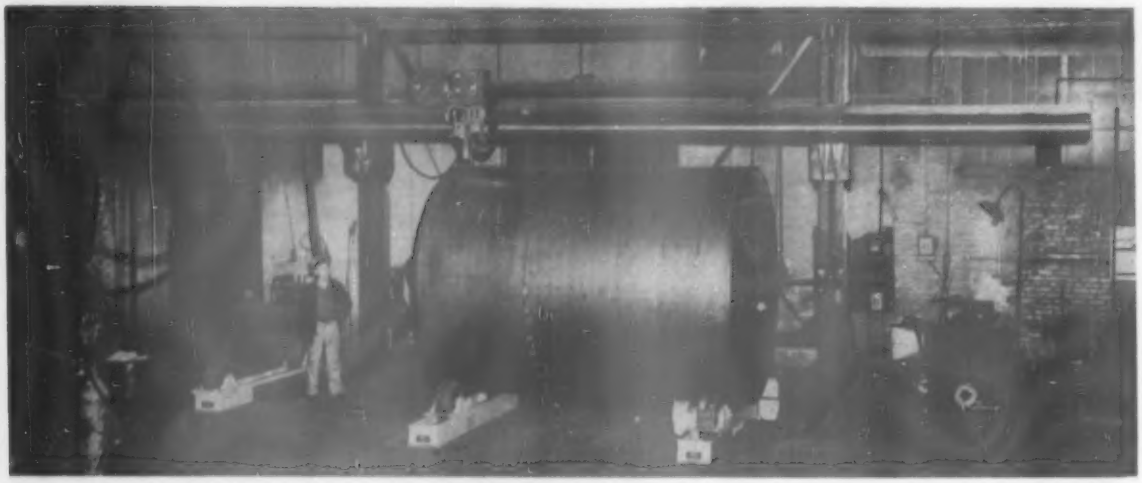
The use of series-arc welding has resulted in important savings. Welding is fast—375 lb of welding wire are deposited in 40 hours. Cladding done by previous methods took about three times as long to apply and required twice as long to finish. The low, smooth deposits need only a minimum of finishing.

Metal deposited by series-arc welding is of very high purity. Dilution of weld metal by base metal is frequently less than 10%. This makes it possible to use moderate-cost alloy wires instead of extra-cost high-alloy wires.

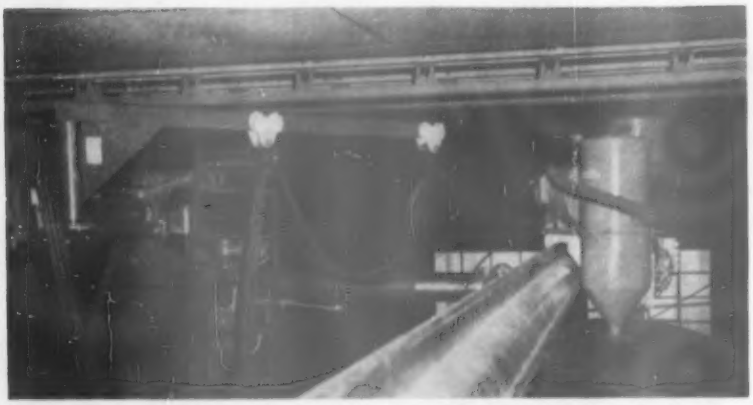
Photos courtesy Linde Air Products Co.



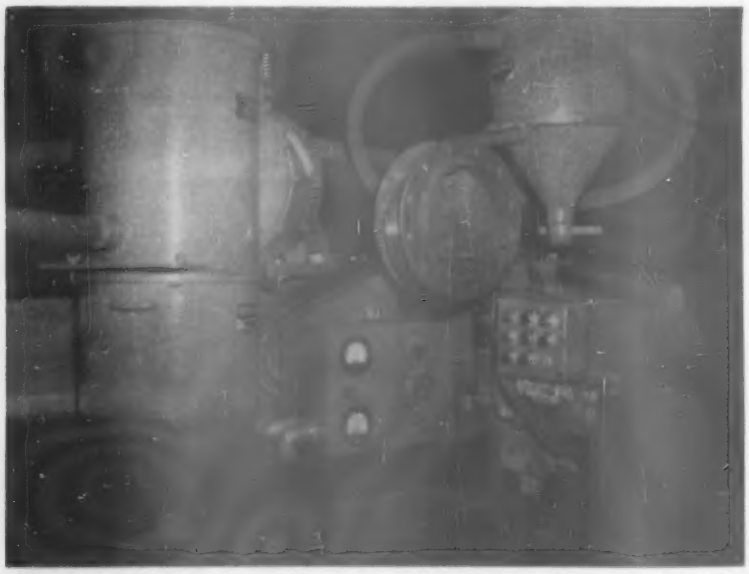
3—CRITICAL areas are protected from wear, cavitation and erosion



New long-track "Tank Master"



3—JIB crane traveling on a separate carriage supports welding cables



4—FLUX feeding and cleaning units are above small hopper and at left

BY JEROME W. WOOD
Vice-President, Niles Steel Tank Co.

NILES Steel Tank Co., Niles, Mich., recently installed a most convenient long-tracked machine we call a "Tank Master" for making external submerged-arc welds on steel tanks and pressure vessels. In developing this machine, the company had the active collaboration of the Automatic Welding Co., Elm Grove, Wis., which designed and built the machine. The several time- and labor-saving features included were devised partly by the maker and partly by the purchaser.

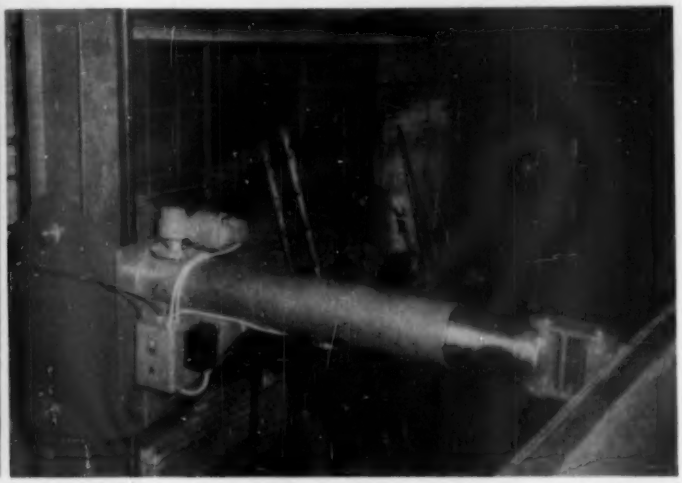
The carriage that supports the submerged-arc welding head travels on a track 40 ft long. The long track enables the machine to produce continuous longitudinal welds up to 36 ft long without moving the tank. To insure that the track will always remain straight, it was mounted throughout its length on a boom, a tube of 12-in. diameter and $\frac{3}{8}$-in. wall thickness.

TRACK MOVABLE, TOO

The weight of the track and tubular boom is taken by two heavy knuckle joints spaced 20 ft apart. These are carried at the ends of telescoping transverse tubes that travel up and down on vertical I-beams (photos 1 and 2). The knuckle joints are capable of $3\frac{1}{2}$ ft motion at right angles to the track and of 7 ft vertical motion so that tanks ranging from 3 to $10\frac{1}{2}$ ft in diameter can be readily welded.

Among the specifications was one requiring that the machine be built

1—TWO telescoping tubes support boom that holds the track for the welding head



2—MOTOR feeds telescoping tube in or out, and a motor-driven elevating screw raises or lowers support. Knuckle joint at right

without any attachment to the building structure. The vertical I-beams that carry the track supports are arc welded to floor beams, to transverse horizontal tubes and to diagonals. Thus a rigid framework is formed, which requires no fastening, even to the shop floor, and it is possible to move the machine from one location to another without detaching or reattaching it to the building.

There are good crane facilities below the ceiling. The crane can shift tank components or tacked assemblies, also turning rolls, into position without fouling the track, which can be pulled back and out of the way. After the tank is in position, the track can be moved centrally above it or to any intermediate position.

Set-ups Made Quickly

An automatic welding head can lay down weld beads from four to ten times as fast as they can be produced by hand welding. It is seldom noted, however, that these time savings may be lost altogether if delays in set-up are excessive. One objective of our new machine is to reduce set-up time to a minimum.

We save set-up time largely through quick adjustment of the track for height and for transverse position and by making it unnecessary to align turning rolls or other supports to bring the tank into precise position relative to the machine frame. Obviously, it is a whole lot easier to adjust by moving the track back and forth than it is to move a large-diameter shell supported on turning rolls. If the longitudinal joints are not set initially quite parallel to the track for the travel carriage, the parallel position is quickly attained by merely moving one or the other of the telescoping supports. The knuckle joints can be moved simultaneously or individually to bring the track parallel to the seam.

Telescoping and vertical motions are effected by motors (photo 4), pushbuttons for which are on a control panel next to the automatic head. The panel for motor movements is close to the panel for controlling welding current and voltage.

At the welding head, there are the usual hand screws for fine adjustment of electrode position. There is also a separate, motorized adjustment to allow the head to be set vertically (for 12 o'clock welds) or tilted at any angle between vertical and the 2 o'clock position for making girth welds. Welding current is supplied by a 1,200-amp d-c motor generator, which is located back of the base of the machine.

One of the problems we had to face was that it requires 75 ft of heavy cable to reach to the ends of the track. To carry so large a weight of cable, the machine now includes a swinging jib crane (photo 3) that turns about a vertical pivot. The pivot of the jib crane is mounted on a separate carriage and runs along a separate track at the back of the welding head. Trolleys running along the crane boom take the weight of the cable, and the crane itself can swing as the head is traversed along its own track.

Flux Can't Run Out

The usual granular flux is fed from the usual hopper, and its flow is controlled by the welding head. So far all is conventional, but when it comes to very long welds the head hopper must have its flux supply renewed without interrupting the welding. This is accomplished by a vacuum-operated flux-handling system that travels on a separate carriage. This carriage, however, is connected to the travel carriage that supports the welding head and its control panels.

The flux-supply system (photos 3 and 4) includes a large hopper, a hose and a dust collector. The hopper is immediately above the welding head hopper and keeps the latter well supplied with flux. The hose is arranged to suck up unfused flux and return it to the large secondary hopper. Dust and fines are removed by a suction blower and sent to the dust collector (left in photo 4).

The wire reel is on the main carriage. Mild-steel wire 5/32, 3/16 or 7/32 in. in diameter is fed to the welding head in the usual way. While welding is in process, an operator stands or sits adjacent to the welding head and makes whatever adjustments are required. He also sees that flux is fed into the head hopper as often as the supply needs replenishing.

(Continued on page 38)

GENERAL view of welding and heat-treating area. Fixtured carts are visible in left foreground of this . . .

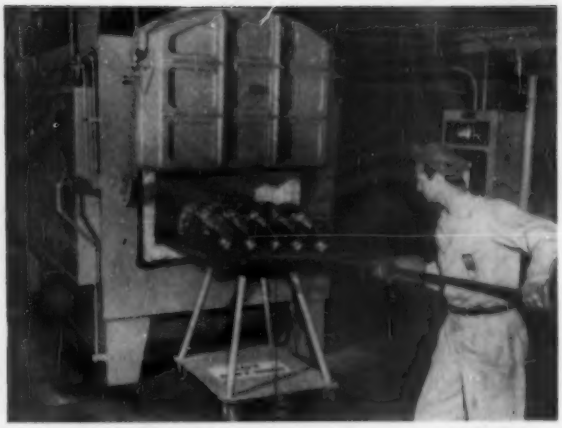
Stack assembly production line

The El Segundo Division of Douglas Aircraft Co. has set up a production line for welded exhaust stacks that is a modern marvel of departmental self-sufficiency.

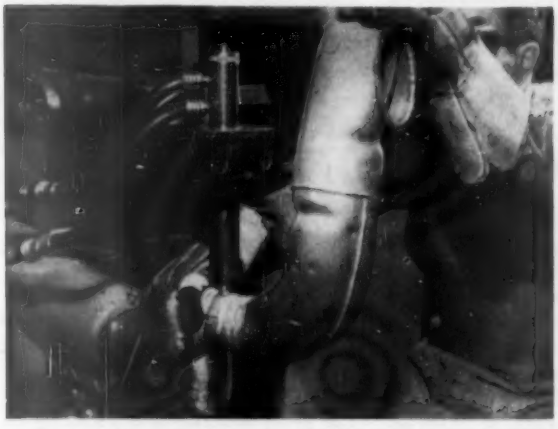
1 One of the first operations is to cut the blanks from stainless-steel sheet stock. Rotary shear follows the stencil imposed from a template

2 Mating components for each stack are formed on a press

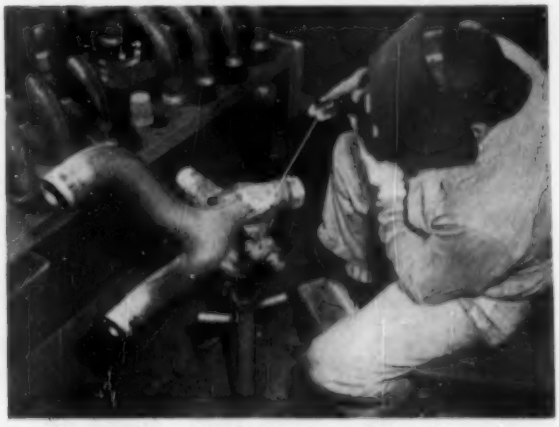
3 Tig welding a stack assembly. Argon gas is used as a shield while interior is protected by flux



4 Welded assemblies go into a furnace for 30-minute restabilization at a temperature of 1,600 F



5 Attachment sleeve is rolled into place for a tight fit and is spot welded in two rows



6 Manual arc welding (not Tig welding) is used to fuse spot-tacked attachment accessories to stack

BY GILBERT C. CLOSE

DEPARTMENTAL self-sufficiency — the ability of a single production department to operate without aid from other departments—is becoming a trend in the aircraft industry. This trend was inspired by the limited productions runs common to aircraft work.

It is no simple task to route a couple of prototype parts, and maybe a maximum order of 50 production parts, all over the premises of a huge aircraft plant in order to have these few items progressively cleaned, heat treated, welded, plated, stress relieved, etc., in a different department for each operation. There is another and better way of doing it.

When the El Segundo Division of Douglas Aircraft decided to manufacture its own exhaust stack assemblies for aircraft engines, it set up a production line that is literally a "factory within a factory."

Flat sheet stock enters at one end. Completed exhaust stocks, ready to be mounted, leave at the other. And in between, none of the parts has to be routed to other departments for any manufacturing or processing operation. Shears, stamping equipment, tack spot welders, heat-treating furnaces, cleaning and processing facilities, inspection equipment . . . all are as much a part of the line as the enclosed welding booths.

KEEPING UP WITH ALTERATIONS

The Douglas decision to manufacture its own exhaust stacks instead of subcontracting them was prompted mostly by considerations of convenience and time saving. These exhaust stack assemblies are a highly critical item, both qualitywise and in tolerance. They are continually affected by engineering and design modifications to keep them in line with airplane model alterations and with changing specification requirements. Liaison with an outside subcontractor was always a headache to both parties. Hence, the Douglas El Segundo Division decided to produce its own stacks, setting up a production line for this purpose at Torrance, Calif.

Raw material of a stack is type 347 stainless-steel sheet, supplied in thicknesses ranging from 0.020 to 0.64 in. This sheet must be sheared and formed before welding.

Fundamentally, all exhaust stacks are produced by fusion welding together preformed and mated left- and right-hand tubular components. The blanks from which these tubular components are preformed are cut from the flat sheet stock using a rotary shear (photo 1). The shear follows

a template. Tolerances are not critical in shearing as the edges of all tubular components are flanged to facilitate tack spot welding during mating.

After the blanks are sheared, they are preformed on a big hydraulic press (photo 2). The dies used for this forming are made of a zinc die-metal alloy and are faced with steel inserts at points where a severe draw is required or where a sharp radius is necessary. Mated dies are used for producing mated parts. To minimize changes in set-up, however, a number of either left- or right-hand components are produced at a time with one set of dies.

Immediately after forming, the tubular components go through a caustic bath and nitro pickle solution to remove normal surface impurities and all traces of the zinc die metal. This cleaning is followed by a hot-water rinse. The parts are then annealed by bringing them up to a temperature of 1,900 F in a furnace.

Getting Ready for Welding

After cooling, the flange on the edge of each part is rough trimmed on a 36-in. friction band saw, using a blade speed of 11,310 fpm. Enough flange is left, however, to afford a good mating seat when the parts are tack spot welded together. Before this step is reached, the parts receive final stage forming in another press, an operation that imparts the finished contours and flattens the flange for optimum seating. A second cleaning is introduced at this point to prepare the tubular components for spot tacking.

To be noted about this spot-welding operation: the electrodes are redressed every three or four parts to assure cleanliness and accurate angular mating. The components are mated visually by an experienced operator, then spot welded about every 4 in. along the flange area. Retrace spot welding is then accomplished with the spots approximately ½ in. apart. This results in a tight and nearly leakproof mating seam along the flange.

After tack spot welding, the protruding flange is trimmed down to about 3/32 in. The protrusion is fused flush with the surface during subsequent welding, but before fusion welding the part must be fluxed. This is accomplished by plugging the stack assembly at one end, then filling it with a back-up flux. When the stack is emptied, an adherent layer of flux covers all interior metal surfaces and effectively prevents any oxidation.

After this fluxing, the stacks are ready for fusion welding. The tungsten inert-gas process is used, with argon providing the shield for the exterior surface. The flux blanket, of course, protects the inner surface. A stainless-steel filler rod supplements the metal in the protruding flange, which is fused downward into a smooth, surface-flush weld seam (photo 3).

After welding, the flux blanket is removed by immersing the part for 30 minutes in an alkaline bath held at 170 F. This is followed by a hot-water rinse to facilitate quick drying. The welded parts are then restabilized by a 30-minute heat treatment at 1,600 F (photo 4) and are ready to receive "welded on" components such as attachment sleeves, adapters for flame dampeners and cup doublers.

Adding the Accesories

The attachment sleeves are first pressed into position in the end of the stack, then rolled into place on a specially designed rolling machine to provide a tight metal-to-metal fit. The adapters and doublers are then tack welded into place, and finally the sleeve is spot welded with a double row of spots (photo 5). The entire exhaust stack assembly is then refluxed for manual arc welding (photo 6). After the adapter and doubler have been welded in place, the stacks are set up for fitting and tacking the cup, then fluxed and welded. The completed stack is then cleaned and pickled to provide a bright, clean surface.

Final inspections for quality and dimensional checks come next. Overall dimensions of the stack assemblies must be held within 0.010 in. When stacks do not meet this tolerance requirement in the "as-welded" condition, a slight amount of hand work will usually correct the fault.

Prior tack spot welding of all components simplifies jigging during fusion welding. The jigs are primarily holding fixtures, with end plugs for the exhaust stack orifices that assure proper placement. Of course, adequate measures for compensation of expansion are engineered into each jig.

Carts Hold Fixtures

When the exhaust stack line was first broached, it was planned to use overhead conveyors to route the parts along the production line. However, it was decided that conveyor carts with special holding fixtures would be more convenient. These carts enable mated parts to be kept together without confusion up to the time of assembly for spot tacking. Even beyond this point, fixtured carts are still used to move the stacks along the production line.

Despite the complexity of the operations involved and the necessity to maintain highest quality, operation of the Douglas exhaust stack line is so smooth flowing that the entire procedure seems easy. Plant engineers attribute this to the fact that very close coöperation was maintained between Production and Engineering at the time the line was planned, laid out and tooled.

Unless both Production and Engineering are given the chance to air and solve their various problems, a smooth-running production line is next to impossible. It can be achieved, however, as this brief case study shows.

"TANK MASTER"

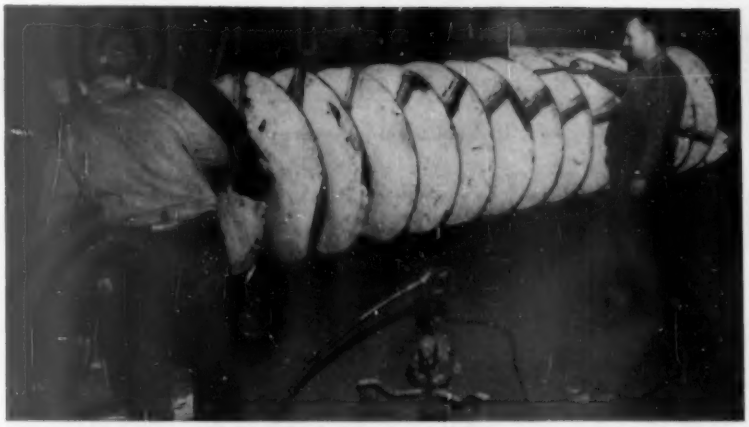
(Continued from page 35)

With this machine, welding speeds vary from about 36 to 60 ipm, depending upon the thickness of metal. The usual material is 3/16 to ½ in. plate, although heavier stock can be welded. Tank shells and ends are usually made from the conventional boiler plate, but stainless steel is also welded readily, using stainless wire of the same composition as the tank steel.

With the automatic head, it is possible to attain full penetration in a single pass unless unusually thick steel has been specified. With good fit-up burn-through can generally be avoided. In the few cases where burn-through cannot be avoided, a backing strip is tacked in place inside the seam and remains in the tank after welding.

When welding from both sides is required, the internal welds must be made by hand. The machine is designed for external welding only. However, that is the only limitation on our new machine. Though installed only recently, it has already proved its utility many times over and is now in almost constant demand for automatic-welding jobs.

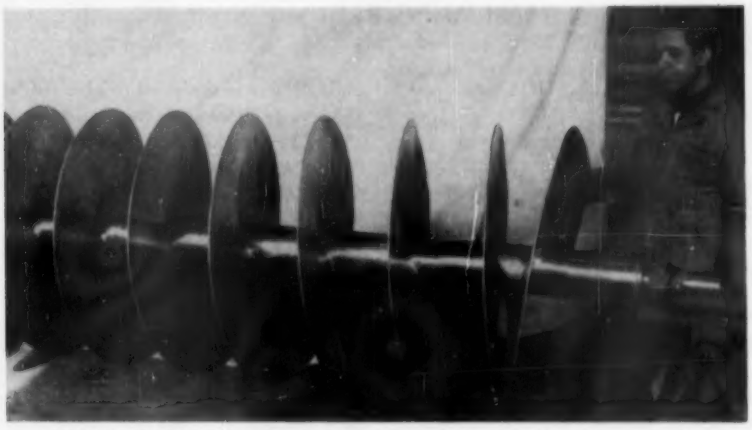
Photos courtesy The Lincoln Electric Co.



NOTE how the welds run clockwise as the eye travels from left to right

TACKING flight to shaft cover

ANTISPATTER protects surface



ASSEMBLED screw. Antispatter and gummed paper have been removed

This tooling-up was easy

BY HERMAN C. PHELPS

ARTISAN Metal Products Co., Waltham, Mass., has devised a method of fabricating conveyor screws in which welding skill replaces costly tooling. Because of welding, screws not conforming to standard dimensions can be delivered at a reasonable cost to the purchaser.

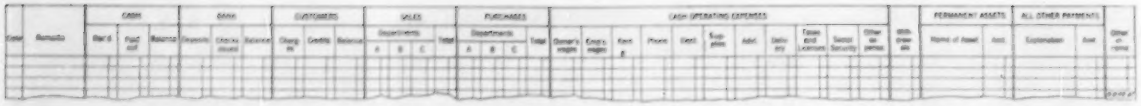
Screw shown in the above pictures is of 3/16-in. type 304 stainless. The screw is built around a stainless-steel-covered steel shaft 22 ft long and 6 in. in diameter. The conveyor blades or "flights" are 37½-in. OD and were laid out on a 12-in. pitch. The finished tolerance was held to ±⅛ in. in the full length of 15 flights, without any machining.

First, the flat sheets were laid out in squares. A nibbler sheared the squares to rings of required OD and ID and then cut from each ring a thin wedge or "pie section" to allow for stretching. A C-clamp and a chain fall were used to pull and stretch each flat ring or flight until its inner edge hugged the shaft all the way around. When proper alignment had been achieved, the flight was tack welded to the shaft cover at 6-in. intervals.

After the first flight had been properly tacked, a second flight was added and so on. As soon as a flight was tacked into position along the shaft, it was welded at the slit edge to the next disc. Because of the way in which the separate discs were stretched around the shaft, the welds at the slits do not follow each other in alignment but run clockwise as one looks or travels from one end of the screw to the other.

Step welding helped to maintain proper alignment in the shaft and to keep the flights perpendicular to it. The electrodes were 5/32-in. a-c/d-c stainless electrodes. One pass was made on each side of the blade to fasten it to the previous flight and to the shaft cover. Aided by a remote control device, the weldor positioned the shaft for downhand welding.

To preserve the surface of the stainless steel near the welds, anti-spatter compound was painted around the joints. In addition, the factory-applied gummed cover was left on the stainless sheet wherever possible. Each tack was ground down prior to finish welding, and every weld was ground smooth after the final pass.



1—SUMMARY ledger sample. Though not a detailed record, it summarizes your situation at any given moment

Simplified bookkeeping forms

Here's practical information for the welding distributor or small job shop! The forms shown will help you to keep proper wage records, show depreciation, exercise inventory control, keep track of delinquent accounts and know how you stand financially at any given instant.

BY B. L. GOUGH

ACCORDING to a recent survey, only 27% of 494 firms that failed kept adequate business records. Bad bookkeeping may not be the primary cause of business failure, but it is certainly associated with it.

Even successful welding distributors and welding job shops may not be keeping the kind of business records that flash warning signals when things are being done the wrong way. Or their records may not be telling them all the many facts they need to know, including—important in these days—the figures that must be dug out periodically for various tax and licensing forms.

How Am I Doing?

To plan a bookkeeping system, it is necessary to first decide what jobs the records should accomplish.

How much dollar volume am I doing? How much cash do I have on hand and in the bank? Is this the amount I should have? How much inventory do I have on hand? How much money do I owe—and to whom? Who owes me—and how much? How large were my expenses? How great is my gross margin? How much net profit did we earn? How much tax will I have to pay? What are the trends—are we progressing from year to year? What are the expense trends from year to year and from month to month? How much can I afford to pay myself for personal salary and still leave healthy profits in the business?

The system of bookkeeping explained here is designed to give ready answers to these important questions.

The key to this system is the keeping of an accurate summary ledger, which reflects—on one sheet—every operation of the company. The summary ledger is not a detailed recording of every wage payment, inventory record or cash control. What it does is to summarize the situation at any given moment.

The form reproduced (Fig. 1) is designed to be used for one month. Let's see how it works by considering several transactions in one month's affairs of Johnny Jones—owner of a small job shop.

On Feb. 1 Johnny's secretary put a voucher on his desk for $15 to purchase a roll of 3-cent stamps for her desk. Jones signed the voucher and put it into the petty-cash drawer, from which he withdrew the cash; then he entered the amount of $15 under the "paid out" column of the cash account. The explanation of what the $15 was spent to buy was entered under the "Remarks" column as "Postage," while the date was entered in the first column at the extreme left. All cash taken in or paid out was entered in the same manner, and at 5 p. m. Jones checked the balance shown with the cash actually in the drawer.

Jones departmentalizes his firm under alphabetical symbols—shown on the form—in order to have a ready breakdown of figures that show which operations are profitable and which are not. Another thing that the form does is to provide for "Cash Operating Expenses." If, for instance, gasoline is purchased for shop trucks, the expense is entered under "Delivery" in the group of operating expenses.

On Feb. 14, Jones prepared checks for people on the payroll and signed his own pay slip. He entered the facts under "Cash Operating Expenses,"—being careful, as with all of his bookkeeping, to note the date and the proper names and reasons under "Remarks."

A printer presented Jones on Feb. 20 with an invoice for advertising. He paid the invoice immediately to secure a 2% cash discount and charged the amount under "Advertising," along with date and explanation in the "Remarks" column. As he writes each check, Jones carefully notes the figures under the "Bank" account and brings his balance up to date.

With very small businesses, the summary ledger may furnish all of the records needed. But usually greater detail is required, and the figures on the summary ledger are "summaries" of facts gathered from other records.

Control of cash, for example, is a bookkeeping task that requires a cash-voucher form. The total of cash remaining and cash vouchers should always equal the amount that was in the cash drawer when it was last refilled.

Wage Records Complicated

As another example, an employer is required by law to maintain records which show far more than the wages he pays to each employee. He must keep records of income tax withheld, of social security and of state payroll tax for unemployment insurance. In a few states, where both employer and employee contribute to the employee's old-age income, a record of the employer's own contributions must be kept. In some cases, owners arrange to deduct other items from pay such as Red Cross and other charity contributions or government

Name and S.S. Number	Gross Wage	Withhold'g Tax	Federal S.S.	State S.S. Deducted	State S.S. We Pay	Other Items	Net Wage

2—FORM above keeps you straight with laws on employee pay deductions

Number and Description	Cost	Life	1955	1956	1957	1958	1959

3—DEPRECIATION and balance are entered for each year of equipment life

INVENTORY

Department _____

Month ending _____

Description	Beginning	Withdrawn	Purchases	Normal	Ending

4—SIMPLEST inventory form provides "normal" column to act as a red flag

Name _____

Date	Billed for	Total	2nd Statement Sent	Overdue

5—CUSTOMERS don't always pay on time. Overdue accounts are shown here

bond deductions. These many deductions require records more complex than can be kept on a summary sheet.

The wage form (Fig. 2) tells all of the needed facts at a single glance. It is set up to act as the pay sheet for all employees for a given payday. The date is entered at the top, the employees' names and social security numbers are entered in the first column.

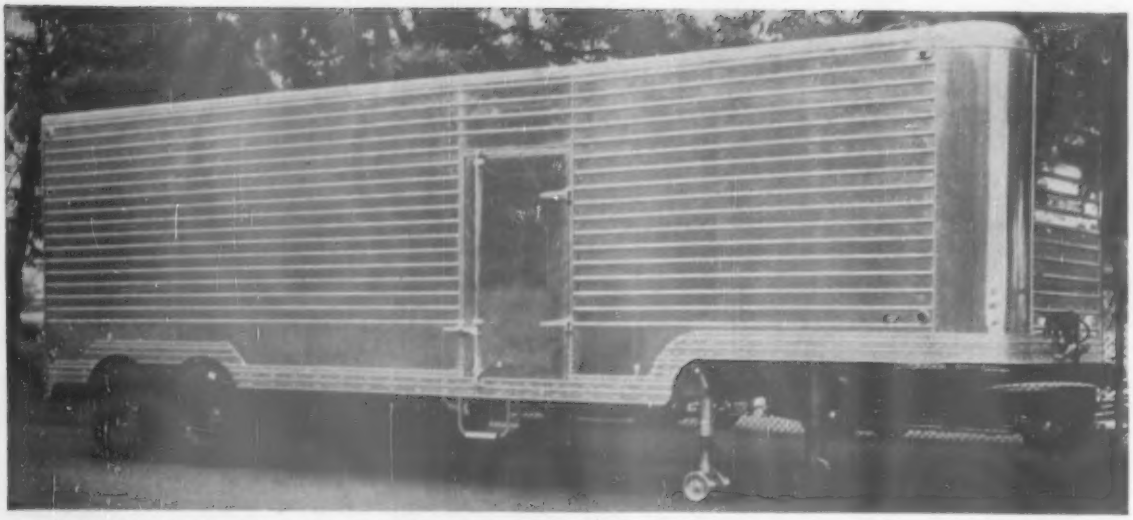
Noted after each employee's name is his gross wage, the amount of income tax withheld (withholding tax), the Federal social security deducted, the State social security deduction (if any), the amount of State payroll tax put up by the firm and other deductions. The final column indicates the net wage, which is the employee's "take-home" pay—the amount that actually reaches his hand.

The summary ledger has columns for indicating the worth of equipment. But equipment is never worth its purchase price since it "depreciates" from year to year. The form for a depreciation record (Fig. 3) furnishes the facts needed to summarize worth of capital investment in equipment. The name and stock number of the item is entered, along with the date it was acquired. In the next columns go the cost and expected life. If the piece of equipment is expected to last for five years, the depreciation rate is 20%. That is how much the item goes down in value every year. Under the year columns, the amount of depreciation and the balance (actual worth of equipment) are entered for each year of the expected life.

Perpetual Inventory

What about materials and supplies? To know how much each department has on hand, many shops maintain modern perpetual inventory systems. The simple form (Fig. 4) provides space for a description of the item (the name of the vendor and the stock number should be noted) and columns for withdrawals and purchases. Whenever the withdrawals from stock have brought quantities below a safe minimum, as indicated by the normal column, a re-order should be made.

All customers don't always pay when they receive your statements. The credit form (Fig. 5) "controls" these delinquent accounts. It indicates immediately when an account is running overdue.



STEP-FRAME aluminum trailer built for Safeway by Brown Trailers. Many welding processes were needed to make it

Monocoque* aluminum trailers

BY HOWARD E. JACKSON

THE management of Brown Trailers, Inc., of Spokane, Wash., Toledo, O., and Reading, Pa., has pioneered a number of aluminum transportation products, including the "Metalark" airplane. Today 55% of the company's production facilities are devoted to an aluminum van trailer, and the monocoque construction principles that the Brown brothers learned in building their airplanes have been applied to their trailer design. No frame is required since the stressed skins of the side walls and even the roof share support of the trailer's load.

Many different welding processes are employed. The aluminum floors, door frames, door header assemblies, extended corner posts, front corner caps and reefer sills are Tig welded. Spot welding is employed for attaching the door skin to its frame. An automatic submerged-arc welder is used on the channel assemblies for the steel king pin. Metal-arc welding is done on the king pin assembly, axle seats, bumpers, etc. Gas welding helps make special parts such as the tubular steel access ladders to ice compartments. An oxyacetylene cutting machine prepares the wing plates of the king pin structure and shape cuts other parts from patterns.

Aluminum door frames are first cleaned with a sprayer or by dipping them into carbon tetrachloride. Next they are clamped into jig assemblies, which can be rotated to Tig weld all four corners. Proper penetration is imperative, and the weld must also look well. Argon gas is used with a plain rod, which is melted into the molten pool in the same manner as good gas welding is done. Current setting is 100 amp.

After Tig welding, the door frames are taken to the door assembly station for installation of reinforcing members. Next they move to the spot welder. Here the skins are laid over the frames, the spots to be welded are cleaned with a solvent and the skin is welded to the frame. Large work tables in front of the welders support the work.

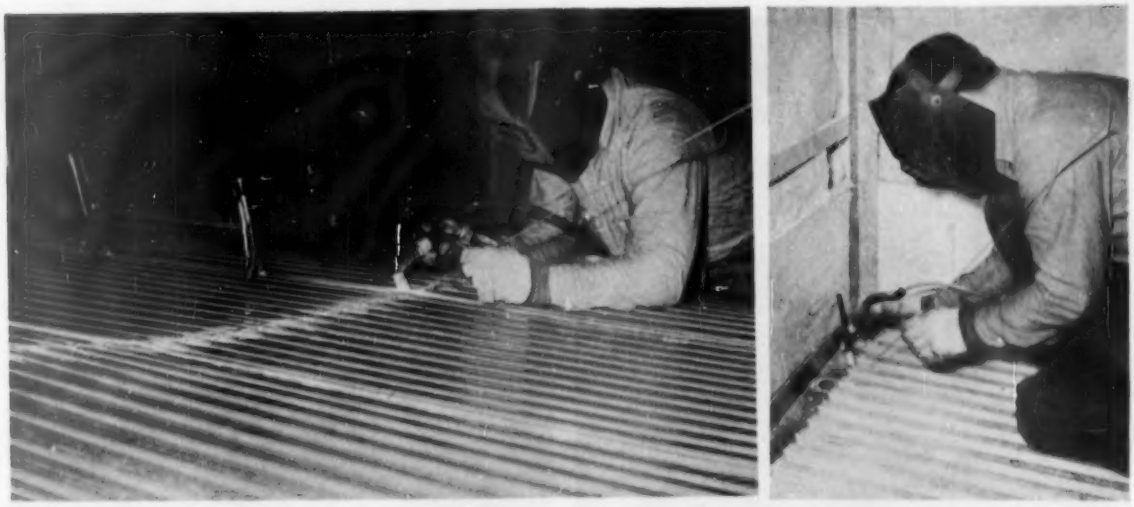
The corrugated aluminum floor sections are sawed to length with a saw equipped with blades designed for the cutting of aluminum. The end of each floor section is cut to fall in the middle of a sill, which reduces the strain on the welds.

Standard 12-ft floor assemblies are welded according to a set procedure. Three segments are placed side by side on long tables and clamped with vise grips. Welds are then made down the seams, using 1/8-in. tungsten electrodes, a current of 185 amp and an argon flow of 7 liters (about one-fourth cubic foot) per minute. Next, a 12-ft segment of floor is welded end to end with the center section of the three-segment assembly. Then the two outer segments are placed at each side and welded lengthwise to the center segment and also across the ends, where they butt the first three-segment section. At the butts, each side of the corrugations must be carefully welded—a tedious job but essential.

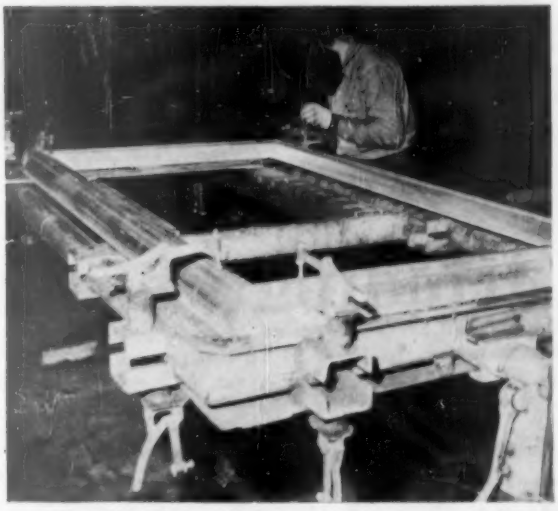
On some floors a plate is tack welded across the rear end. It is notched between the corrugations so the cargo can be drained and then Tig welded smooth all around the floor end to seal it. Similarly, a plate is tack welded across the front end of the floor assembly and notched between the corrugations on the bottom side. This plate is Tig welded from beneath because it fits tightly against the trailer's front wall.

The two sections of the king pin support box channel are welded along the seam with a submerged-arc automatic welder (page 43). The two sections of 3/16-in. steel are assembled in a jig and air clamped to hold them against a chill bar. A bare 5/32-in. welding wire is used; current is set at approximately 650 amp and travel speed is 40 ipm. Wire brushing is done after welding to remove slag and excess flux.

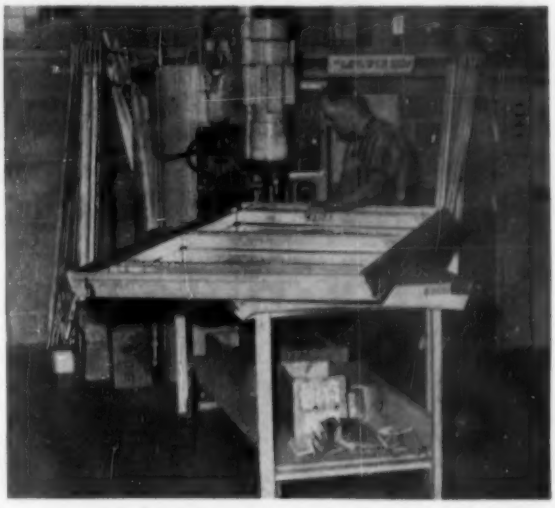
*Monocoque: French word meaning literally "single shell." Term is from the aircraft industry and refers to the type of construction in which the skin is depended upon to carry the stresses arising in the fuselage.



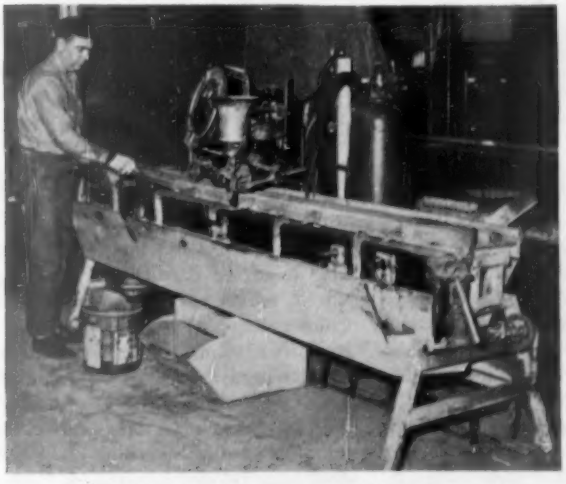
TIG welding is used for corrugated side sheets (left picture) and joining of extruded flooring to trough (right)



CORNERS of door frames are also inert-gas welded



SKINS are spot welded to the aluminum door frames



CHANNELS for king pin are welded by submerged-arc

WING plates for king pin are shape cut by machine

GRINDING out an error on a heavy steel beam requires an entirely different type of wheel from the one used for

smooth finishing of stainless steel. The task of wheel selection may be simplified by a few general principles

Select the right grinding wheel

for
1. Abrasive
2. Grain size
3. Grade
4. Structure
5. Bond

Here are some practical tips. See also Engineering Date Sheet No. 172 on page 47

BEFORE and after most welds there are important jobs to be done: preparation of the joint and finishing. Frequently, both of these operations necessitate grinding. Grinding often provides the most economical and the fastest means of beveling the joint prior to welding. And after the weld has been made, grinding is needed to provide the proper surface to receive paints and other finishing materials.

Grinding and welding go hand-in-hand, like ham-and-eggs or pork-and-beans. So closely are they tied together that without grinding it would be extremely difficult, if even possible, to do the welding jobs that are being done today.

Grinding, however, is no mere adjunct to welding but a whole complicated process in itself. Various combinations of abrasive, grain size, grade, structure and bond make possible hundreds of different grinding wheels, which may look similar but will act altogether differently in operation. Not all grinding wheels work with the same degree of success on all metals. Not all grinding wheels work well at the same speeds. The same grinding wheel will not serve for swift stock removal and for smooth finishing. If you are grinding a large, flat

surface, you will need an entirely different type of wheel from that you will require when a very narrow surface is to be ground.

Here are some practical clues, guaranteed to help you find your way through the grinding-wheel labyrinth.

The general range of grinding-wheel specifications for a particular metal may be ascertained by consulting tables, such as the one given in the Engineering Data Sheet on page 47 of this issue of WELDING ENGINEER. The problem is not always to be solved this easily, however, because the proper selection of a grinding wheel should be based upon more than a knowledge of the material to be ground. A proper wheel selection cannot be made until four factors, common to every grinding job, have been taken into consideration. These are:

1. Amount and type of material to be ground.
2. Finish and accuracy required.
3. Area of contact between work and wheel.
4. Type of grinding operation.

Obviously, the table you will find on page 47 can give only a limited help. Before deciding on a specific wheel (particularly if a quantity of wheels are to be purchased for a particular type of work), a certain amount of testing should be done. The greater the anticipated quantity of wheels, the greater the amount of testing that is justified.

How Wheels Are Specified

The two chief components of any grinding wheel are: (1) the abrasive grain and (2) the bond. The latter is the "glue" that holds the abrasive particles firmly in place.

Under abrasive, it is necessary to consider *(a)* the type of abrasive (as a chemical compound) and *(b)* the size of the individual particles—grit or grain size. The wheel "structure" (more details later) is determined in part by the size of the grains since larger grains will mean that there are more pores or air spaces between the particles.

Another basic wheel element, grade, may be defined as the holding power of the grains to their bond. A rotating wheel brings literally thousands of sharp abrasive grain edges against the workpiece and does it repeatedly and rapidly. Naturally this causes the grains to dull. Wheel pressure on the work (or vice versa) helps to fracture the dull grains and remove them from the grinding surface, thus uncovering new layers of sharp cutting edges as they are needed. This happy replenishment of cutting edges can occur only when the grinding wheel is well suited to the material being ground. If otherwise, the wheel action will be too "soft" or too "hard," and the user will not be getting the best possible grinding results.

"Soft" and "hard" are important grinding terms. A soft wheel releases its abrasive grains before their edges have lost all their useful cutting ability. A hard wheel holds onto the grains even after they have become dull. An abrasive wheel that is too hard not only fails to release its worn abrasive grains promptly but gradually begins to "load" or collect metal particles (called swarf) in its pores or air spaces. The grinding face becomes slicked over and takes on a glazed appearance—a distinguishing feature of a hard wheel. And cutting action is invariably slowed.

The property of softness or hardness is the one designated by the term "grade."

There are thus five basic elements to be considered in the selection of a grinding wheel. Taken together, these five elements will completely define a wheel and determine its cutting qualities. Grinding-wheel manufacturers have long reached agreement that the five elements should be designated according to the following scheme:

1. Nature of abrasive—by a letter.
2. Grain size—by a number.
3. Grade or hardness—by a letter.
4. Structure—by a number.
5. Bond—by a letter.

These numbers and letters are stamped upon the grinding wheel in a combination that looks like this: A24-J6V. Such a number may be prefixed by another figure to indicate the exact kind of abrasive (use of prefix is optional) and suffixed by a final symbol to identify the wheel according to the manufacturer's private marking. See "Standard Marking System Chart."

Possible combinations of the five elements of abrasive, grain size, grade, structure and bond have been estimated at above 12,000. Cheer up! It isn't necessary to select the wheel you want from among 12,000 other wheels. If you know the meaning of each element and understand its basic purpose, you can usually designate the wheel that will best suit a particular job without too great a difficulty.

1. Abrasive

Abrasive selection is relatively easy because, for most purposes, there are only two basic types of abrasive to choose from: aluminum oxide and silicon carbide. And the rule telling which one to use is simple: aluminum oxide for materials of high tensile strength; silicon carbide for materials of low tensile strength.

Generally speaking, aluminum oxide is better for grinding plain-carbon steels and alloy steels including the hard stainless varieties. It is also best suited to annealed malleable cast iron and to the tougher and harder bronzes.

Silicon carbide is the material to use on gray or chilled cast iron, soft bronzes and brasses, aluminum, copper, brittle hardfacing alloys and cemented carbides. Besides metals, silicon carbide is used to grind glass, ceramics, marble, stone and other non-metallics of low tensile strength.

On the Standard Marking System Chart, "A" designates aluminum oxide and "C" designates silicon carbide. These two letters are all you need to remember to recognize the type of abrasive.

2. Grain size

Grit or grain sizes are designated by numbers, starting with 10 and going up as high as 600. "Coarse" grains include the sizes from 10 through 24. "Medium" grains are from 30 through 60. "Fines" are from 70 through 180 and "very fines" from 220 up.

Here are some thoughts to keep in mind when picking a grain size:

Wheels selected to grind hard, brittle materials should have a large number of cutting edges per unit area because the penetration of each grain is slight. More cutting edges mean more grains; hence smaller grains. Thus for hard, brittle materials, a medium to fine abrasive grain should be specified.

Soft and easily penerated materials, or ductile materials, are best ground with coarse-grain wheels, designations 10 to 24. If a large amount of metal has to be removed, the coarser the grain size the better.

For finishing, it is easy to remember that finer finishes require smaller abrasive grains. Should a "mirror finish" be desired (as in the picture

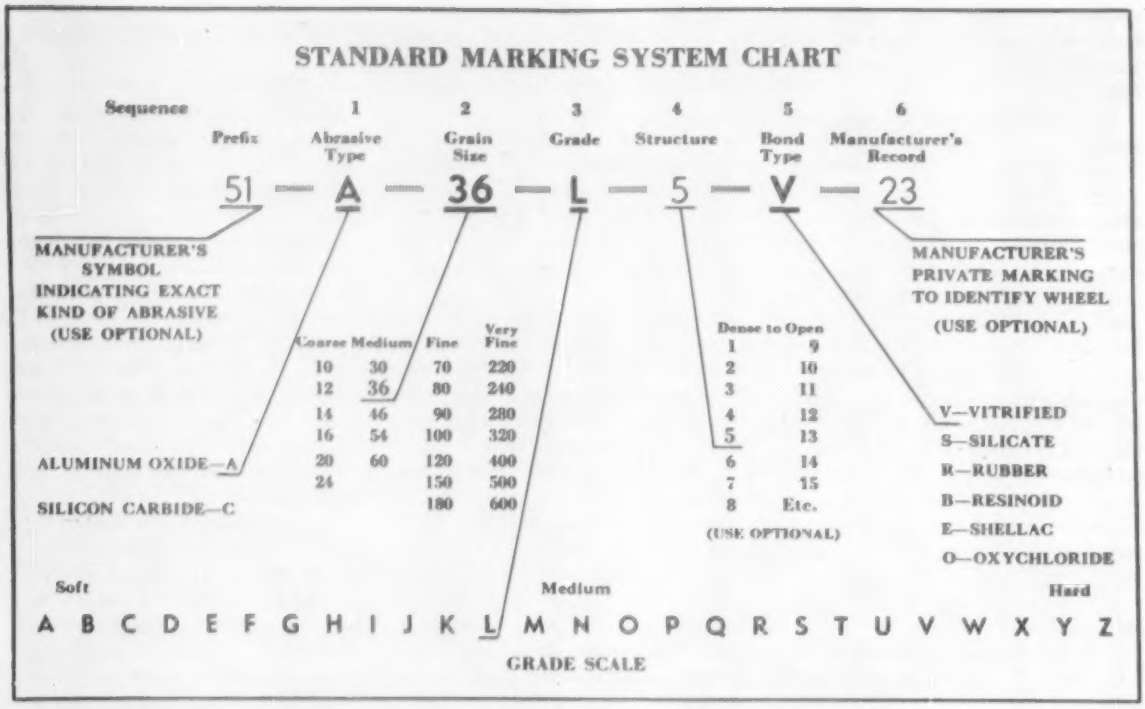


CHART above shows how the number of a grinding wheel is derived. Chief components of the wheel are: (1) abrasive grain and (2) bond. Under abrasive, it is necessary to consider (*a*) type and (*b*) size of individual particles. The wheel "structure" is determined in part by the grain size. "Grade" is the "softness" or "hardness" of the wheel. Taken together, these five elements are included in the number that is given to a particular grinding wheel. Manufacturer's symbol and private marking code may also be included as a prefix or a suffix to number

of the stainless-steel weldment at the beginning of this article), a very fine grain size will have to be selected—one in the range from 220 to 600. Likewise, a fine grain must be used when grinding is to be done to close dimensional tolerances.

The area of contact between the wheel and the work must enter into the specification of grain size. Where the unit pressure between wheel and work is relatively high (small contact area), a wheel of medium to fine grain will be best. Examples of small contact area and corresponding high pressure between wheel and work are to be found in the surface grinding of flat work with the rim of a cylindrical or a cup-type wheel.

A coarse grain is specified where the unit pressure in the contact area is relatively small. A low unit pressure means a large grinding surface in contact with the work; *i.e.*, the flat face of a disc.

3. Grade

We have already explained what is meant by grade or hardness. Grades are designated by letters according to an alphabetical scale. The softest grade is designated by A; the hardest by Z, while the medium range runs from, I through P. Grades A-H are soft wheels; grades I-P are medium and grades Q-Z are hard.

The area of contact between the wheel and work must enter into the specification of grade even more than it enters into the specification of grain size. Where the unit pressure between wheel and work is relatively high (small area of contact), a medium-hard wheel will provide good cutting action and economical wheel life. Where the unit pressure is relatively low (large area of contact), a grade at the soft end of the range should be selected to permit the wheel's grains to break down and provide fresh cutting edges.

Generally, very hard, dense materials require a relatively soft grade of wheel to achieve good stock removal. Hard materials resist the penetration of the grains and cause them to dull rapidly. A soft grain allows the dull grains to break away easily and expose new cutting edges.

More easily abraded soft materials can be ground most effectively with a harder grade of wheel. It sounds topsy-turvy, but that's the way it works out: a hard wheel for soft materials, a soft wheel for hard materials.

4. Structure

The "structure" of a grinding wheel refers to the "holes" between the grain and between the grains and the binder, or to the space relationship between them, if you like that high-brow way of putting it. The wheel structure is largely determined by the size of the pores in the wheel and the spacing between them. If the holes are large and relatively far apart, we have an open structure; if the openings are small and close together, we have a dense structure.

We have already noted the relation that exists between grain size and structure. Think of rough cubes of around a quarter of an inch on a side, bits of coal, say, jammed together. Obviously, there will be plenty of space between them, which means an open structure. Now think of grains of wheat packing together; the space

Grinding wheel recommendations

(See article, "Select the right grinding wheel" in this issue)

Material	Abrasive	Grain	Grade	Bond
ALUMINUM				
Surfacing (cups and cylinders)	C	24	J	V
Surfacing (discs)	C	20	K	B
Portable grinders 5,000–6,500 sfpm	C	24	O	V
Portable grinders 7,000–9,500 sfpm	C	30	O	B
Cutting-off (dry) 9,000–16,000 sfpm	A	24	–	B
Cutting-off (wet) 7,500–12,000 sfpm	A	46	–	R
Cutting-off (Tabor foundry machines)	A	24	–	B
BILLETS (alloy and high-speed steels)				
Portable grinders 5,000–6,500 sfpm	A	20	Q	V
Portable grinders 7,000–9,500 sfpm	A	20	Q	B
BRASS				
Surfacing (cups and cylinders)	C	24	H	V
Surfacing (discs)	C	24	M	B
Cutting-off, gates and risers (dry, Tabor machine) 16,000 sfpm	A	24	–	B
Cutting-off, rod (dry) 9,000–16,000 sfpm	A	30	–	B
Cutting-off, rod (wet) 7,500–12,000 sfpm	A	60	–	R
Cutting-off, tubing (dry) 7,500–12,000 sfpm	A	80	–	R
Cutting-off, tubing (wet) 9,000–16,000 sfpm	A	120	–	R
CAST IRON				
Surfacing (cups and cylinders)	C	16	H	V
	A	60	F	V
Surfacing (discs)	C	16	L	B
	C	24	K	V
Surfacing (straight wheels)	C	30	J	V
Snagging (portable grinder) 5,000–6,500 sfpm	C	24	S	V
Snagging (portable grinder) 7,000–9,500 sfpm	C	20	Q	B
CHILLED IRON				
Surfacing (cups and cylinders)	C	24	H	V
Surfacing (straight wheels)	C	36	I	V
COPPER				
Surfacing (cups and cylinders)	C	14	I	V
Surfacing (discs)	C	36	M	B
Cutting-off, rod (dry)	A	60	–	R
Cutting-off, rod (wet)	A	80	–	R
Cutting-off, tubing (dry)	A	80	–	R
Cutting-off, tubing (wet)	A	120	–	R
Gates and risers (dry, Tabor) 16,000 sfpm	A	24	–	B

Material	Abrasive	Grain	Grade	Bond
MALLEABLE CASTINGS (unannealed)				
Surfacing (discs)	A	20	L	B
MALLEABLE CASTINGS (annealed)				
Portable grinders 5,000–6,500 sfpm	A	20	Q	V
Portable grinders 7,000–9,500 sfpm	A	20	Q	B
STEEL CASTINGS (low-carbon)				
Portable grinders 5,000–6,500 sfpm	A	24	Q	V
Portable grinders 7,000–9,500 sfpm	A	20	Q	B
	A	20	T	R
STEEL CASTINGS (manganese)				
Portable grinders 5,000–6,500 sfpm	A	24	Q	V
Portable grinders 7,000–9,500 sfpm	A	20	Q	B
STEEL (hardened)				
Surfacing (cups and cylinders)	A	30	G	V
Surfacing, roughing (discs)	A	16	K	B
Surfacing, finishing (discs)	A	46	J	B
STEEL (soft)				
Surfacing (cups and cylinders)	A	24	J	V
Surfacing, roughing (discs)	A	16	M	B
Surfacing, finishing (discs)	A	46	K	B
STEEL (high-speed)				
Surfacing (cups and cylinders)	A	46	G	V
Surfacing (straight wheels)	A	46	H	V
	A	60	F	V
STEEL (stainless, free-machining)				
Surfacing (cups and cylinders)	A	36	G	V
Surfacing (straight wheels)	A	46	H	V
Billets and slabs (portable grinders 7,000–9,500 sfpm	A	20	Q	B
	A	24	T	R
WELDS				
Carbon-alloy steels				
Portable grinders 5,000–6,500 sfpm	A	24	Q	V
Portable grinders 7,000–9,500 sfpm	A	16	R	B
Stainless steel				
Portable grinders 7,000–9,500 sfpm	A	24	T	R

From The Grinding Wheel by Kenneth B. Lewis, Grinding Wheel Institute, 1951

between individual particles has seemingly disappeared and we have a dense structure. The coal represents coarse abrasive grains and the wheat fine abrasive grains. For the structure of very fine abrasive grains, think of flour.

The pores of the wheel serve many purposes: they clear chips, help control the flow of coolant to the work, permit various depths of cut and different degrees of finish. They may also affect wheel dressing. Obviously, an open-structure wheel will load faster (but will remove more material) than a dense-structure wheel.

Structure is designated by numbers. On the Standard Marking System Chart, dense structures run from 1 to 8; open from 9 to 15. The structure specification is optional, and it is not included in the grinding wheel recommendations appearing on page 47.

The significance of structure numbers is distinctive with each manufacturer of grinding wheels, which explains why such numbers were omitted from our Engineering Data Sheet. Each grinding-wheel maker publishes his own table of recommendations.

5. Bond

There are two common types of bonds, vitrified and resinoid. Vitrified bonds, being ceramic, are hard while the resinoid or organic varieties have a slight degree of flexibility. The classification of bonds, however, is not simple as that of abrasives because there are other types of bonds that must be considered. The complete list and their designations are:

V—Vitrified
S—Silicate
R—Rubber
B—Resinoid
E—Shellac
O—Oxychloride

In selecting a bond, here are some pointers to keep in mind:

Thin wheels and those subject to strain may require a resinoid, shellac or rubber bond.

Solid wheels of large diameter require silicate as a bond.

Vitrified bonds may be specified for wheel speeds up to 6,500 surface feet per minute. Above that figure, resinoid, shellac or rubber bonds should be used.

Resinoid-bonded wheels will provide the highest finish. If a high finish is required, specify resinoid, shellac or rubber bonds. Vitrified wheels usually prove best for roughing and semifinishing.

Choice of both the abrasive and the bond are affected by the nature of the grinding operation. Putting a "commercial" finish on steel, for example, calls for a medium-grain aluminum-oxide abrasive in a vitrified-bonded wheel. If the same part is to be ground to a "mirror" finish (a situation not likely to happen), silicon-carbide abrasive in a resinoid-bonded wheel is required. Sometime a shellac-bonded wheel is used.

Wheel Recommendations

While it is not feasible even to attempt to cover the possible grinding conditions and to make specific recommendations for each, the specifications given in the data sheet will help to get started. These recommendations were selected from a much longer and more complete listing given in *The Grinding Wheel**. The data are based on satisfactory field test performances.

It should be re-emphasized that different makes of wheels with identical markings do not necessarily provide identical grinding performance.

There are modifications of both abrasive and bond that are peculiar to individual companies and could not be included in the data sheet. Likewise, the designation of structure numbers is distinctive with individual companies. Each grinding wheel maker publishes his own table of recommendations, in which grains, bonds and structure numbers are given. For a specific make of wheel, such tables are more accurate.

Speed Affects Wheel Choice

It should be recognized that the speed at which a wheel is operated is one of the factors affecting grinding performance. It is important to remember that as a wheel wears down its diameter becomes smaller and the surface speed (expressed in feet per minute) decreases accordingly.

In grinding carbon-steel or alloy steel welds with low-speed portable grinders (5,000 to 6,000 surface feet per minute—sfpm), the rule-of-thumb is to use an aluminum-oxide abrasive with a vitrified bond. In the absence of previous experience, the user would do well to try an A24-Q5V wheel or one having a similar specification.

High-speed portable grinders, operating between 7,000 and 9,500 sfpm would require aluminum oxide with a resinoid bond. A wheel somewhere between A16-R4B and A20-P4B would provide the best combination of wheel, work condition and material.

More stainless-steel welds are being ground today than ever before. Portable grinders operating in the 7,000 to 9,500 sfpm range are often used for this purpose. For these applications, there are manufactured a limited number of rubber-bonded, aluminum-oxide grinding wheels that are very effective. A good choice would be an A24-T6R wheel.

Cup-shaped wheels, usually resinoid-bonded, are widely used on portable weld grinders. During the past few years, reinforced resinoid, hub-type wheels have found increasingly wide use in weld grinding. Reinforced resinoid wheels have exceptional strength and resistance to breakage, permitting a relatively high wheel speed and allowing the side of the wheel to be used to grind the workpiece.

The strength and limited flexibility of these relatively thin and disclike wheels comes largely from the method of construction, in which each layer of abrasive is alternated with a layer of reinforcing fabric. Their flexibility permits the side of the rotating disc to bend slightly and hug the work, resulting in efficient stock removal.

A new development that should increase the safety factor in grinding is a resinoid-bonded wheel having two rings of fibrous material embedded in the usable portion of the wheel. These rings reinforce the wheel and help keep it from shattering but will abrade away without any interference to the grinding action.

For beveling edges and preparing joints before welding, a resinoid-bonded wheel 6 to 9 in. in diameter and from ⅛ in. to ¼ in. thick is a good choice. For general work, a 24-grain aluminum-oxide abrasive is suitable. For light stock removal, where a better finish may be needed, use a wheel with smaller size grains, say 36.

*The Grinding Wheel, Kenneth B. Lewis, The Grinding Wheel Institute, Greendale, Mass., 1951.

on the job . . .

Nelson Stud Welding photo

PRIVATE lives of ocean's inhabitants are watched from stud-welded window ports at the new "Oceanarium"

Lincoln Electric Co. photo

COMPLETED 300-ft dock is expected to be as permanent as anything can be that is exposed to winter weather

Marine marvels on display

APPROXIMATELY 5,000 fish and other sea animals, valued at over a million dollars, can be seen in the deep tanks of California's newly opened $3,500,000 "Oceanarium." Pressure exerted against the viewing windows by 500,000 to 600,000 gallons of salt water is met by the stainless-steel studs that hold the window frames. It was not necessary to drill into or through the tanks. The stud-welding gun was also used to install the indirect fluorescent lighting units above the viewing windows and in the erection of the sweeping aluminum canopies around the various promenades.

The Oceanarium, which is located at the Palos Verdes Estates, southwest of Los Angeles, contains two large tanks. One, a circular tank 80 ft in diameter and 22 ft deep, contains sea animals of all sizes that are native to the Pacific Ocean in this area. The other, an oval tank 100 ft long, 50 ft wide at the top and 22 ft deep, contains migratory sea animals of all sizes. The circular tank holds 600,000 gallons of unheated sea water, and the oval tank 500,000 gallons of heated sea water, the water of both tanks being changed at the rate of 2,000 gallons per minute, day and night.

Three bands of continuous windows, 358 in all, surround both large tanks at three viewing levels below the water surface. Each has two thicknesses of special glass $\frac{5}{8}$ in. thick. The various levels of viewing windows may be reached by walking up or down five sloping ramps at the ends and sides of the Oceanarium.

In the concourses surrounding the two large tanks, the visitor will find exotic and interesting sea life housed in smaller tanks that are either heated or cooled. For example, a tropical tank 15 ft long contains a coral reef lifted from the floor of the warm waters off the coast of Hawaii; a grotto-like tank of like size that houses a family of octopi in a natural seascape with a cool water temperature; nine "jewel" tanks contain many varieties of smaller fishes from many parts of the world including sea horses and an African lung fish that can live out of water.

* * *

Dock for lifetime use

YEAR after year the Yacht Club, of Erie, Pa., heard members' complaints about the buckling and deterioration of wooden docks and catwalks during rough winter weather. This winter the officers of the club decided to do something about it.

T. K. Welsh, a local engineer, designed a "permanent" dock, which is being constructed by Lloyd E. Davis, a contractor with a long record of well-drilling and welding experience. To secure a solid foundation, Davis is drilling holes into five feet of rock and below seven feet of water. While casings hold back the water, Davis inserts railroad iron into each opening, which is then filled solid with concrete. These reinforced-concrete "pilings" are spaced about every five feet along a 300-ft dock, two of which are being built.

About every 20 ft, one of the "pilings" is tied to a utility standard, a row of which runs along the land side of the dock. The tying is done through more railroad iron, which is welded to the piling tops and to the bases of the utility standards—3-in. and 4-in. upright steel pipes. The frame that holds the concrete roofing slabs is made by welding 3-in. angles to both the piling tops and to the cross pieces of railroad iron that tie into the standards from the pilings.

A gasoline-driven d-c welder is used on this unusual job. Welding is done at the full capacity of the machine, around 180 amp, using 3/16-in. E-6012 electrodes.

The 1½-in.-thick concrete slabs weigh over 250 lb each. They are positioned with the aid of a truck-mounted derrick. Salvage railroad iron, angles and piping for the utility standards are helping to keep down the cost of materials.

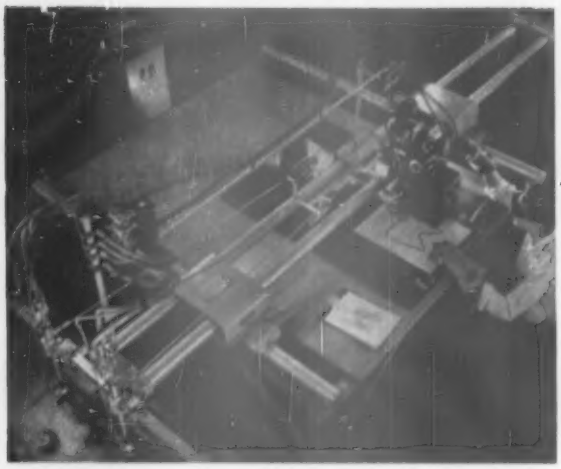
* * *

Tube cutting simplified

TO FACILITATE the retubing of condensers and heat exchanger coils, The Ohmstede Machine Works, Beaumont, Texas, has developed a machine for cutting through the wornout tubes. It consists of an abrasive cut-off wheel mounted on a long, movable arm. One man, using the "bundle slicer" can remove the tubes in an hour and a half whereas it formerly took two men one or more days.

The cutting wheel is a reinforced resinoid-type wheel, especially designed for this job by the Norton Co., Worcester, Mass.

new products . . . . . USE CARD ON PAGE 81



MANUAL, magnetic and electronic tracers can be used

ARC voltage is controlled by torch-to-work distance

Flame-cutter

50 "Duograph" is a rectilinear-type, medium area, oxyacetylene shape-cutting machine with four-torch capacity. The torches may be arranged in wide variety of positions. When equipped with one tracing table, cutting range of the machine is 48 in. wide by 51 in. long. Four 48-in.-diameter circles can be cut simultaneously with two torches at each end of the machine. Cutting length can be extended by addition of extra tracing tables.

Three different tracers—electronic, magnetic and manual—can be used and are readily interchangeable, according to manufacturer. All controls are grouped at "operator's station."

Air Reduction Sales Co.

* * *

Soldering flux

51 Liquid flux is used to solder aluminum and all commercial metals such as stainless, copper, nickel, silver etc. with all soft solder metals and their alloys. Flux is non-corrosive and neutral, and the fumes are non-toxic.

FIM, Inc.

* * *

Hardfacing rod

52 Excellent free-flowing characteristics are claimed for improved cast alloy rod designed primarily for single-pass applications on plowshares, disks and other agricultural equipment. Designated "Mir-O-Col No. 1," the alloy is available for electric or oxyacetylene usage. Flux coating on electrode is said to give a more dense and porosity-free deposit, while the rod is centerless ground to remove scale and oxides, thus promoting trouble-free deposition.

Mir-O-Col Alloy Co., Inc.

* * *

Induction heater

53 Designated for brazing, soldering and laboratory projects, a new 5-kw induction heater is said to be effective also for surface hardening and selective annealing operations. It can be adjusted to operate at maximum efficiency with a wide variety of inductor coils up to its full-rated capacity. Operator can vary work coil current by merely turning a crank.

Other models are available in the new 5-kw line for applications that do not require a transformer. These are equipped with grid control rectification.

General Electric Co.

* * *

Constant-voltage welder

54 Power source is for use with automatic and semiautomatic submerged-arc welding or for Mig (metal inert-gas) welding. Called the "Powromatic," this constant-voltage welder was shown at the recent Metal Show in Chicago. It is rated at 400, 500 or 900 amp, 100% duty cycle. It can be supplied for use with any known make or model automatic head, as well as with this firm's head and adapters.

Hobart Brothers Co.

Electronic control

55 Strong and uniform fusion welds are said to be assured when electronically controlled "HWM-2" voltage control is used with mechanized inert-gas, shielded-arc welding. Besides maintaining constant arc voltage, it turns torch cooling water and inert shielding gas on at start and off at finish of a weld.

Arc voltage is controlled by governing distance of torch from work. Front-panel controls permit operator to pre-set various conditions. Once they are set, he simply flips a switch to start the weld.

Linde Air Products Co.

* * *

Rectifier welder

56 Patented magnetic amplifier in new rectifier d-c welder holds the arc setting you want from strike to break. Designated the "Control-arc," the welder controls both current and voltage. The magnetic amplifier permits complete stepless adjustment through entire welding range. No range switches or taps to change.

Vickers Electric Division.

* * *

Cutting equipment

57 Complete new line of cutting tips, cutting and heating torches, heating heads and other flame-cutting accessories is especially designed for use with propane, butane and natural gas. Equipment is designated "Proxy."

The torch tips are manufactured to fit all standard hand and machine cutting torches and attachments.

Flame Cutting Equipment Co.

Effects "DOUBLE" Protection:

"SPEEDY"

No. 5000 ATTACHMENT

A FIBRE-METAL EXCLUSIVE!

NEW No. 5000 "SPEEDY" ATTACHMENT...

1) Converts Welding Helmet to Safety Cap Use
2) Readily Adapts to Caps in Field
3) Fits All Popular Peak-type Caps
4) Attaches or Detaches Cap Instantly

THIS INGENIOUSLY DESIGNED, *yet simple to use,* "SPEEDY" Attachment adapts the welding helmet for use with a Safety Cap to provide *both* eye and head protection for the Welder when he works under conditions where there is danger of head injury from falling or flying objects.

"SPEEDY" is economical both as to cost and in speed of attachment . . . or detachment! It represents very practically FIBRE-METAL's long experience and ability to provide the best possible *products for protection* that also help make the most profitable use of a man's time.

The No. 5000 "SPEEDY" Attachment consists of two rugged steel Clips with insulated prongs to grip the edge of the Safety Cap; a sturdy, replaceable Neoprene Strap connecting the Clips and providing tension over the top of the Cap. Friction joints hinge helmet on cap. Write for Bulletin No. 43.

No. 5000 "SPEEDY" FEATURES:

- LONG LIFE: ECONOMICAL, PRACTICAL
- SPEEDY ON OR OFF
- FITS ALL POPULAR PEAK-TYPE CAPS
- NO HOLES IN CAP
- NO HARDWARE ON CAP
- CONTINUOUS HEAD PROTECTION
- ADAPTS PRESENT HELMETS TO COMBINATIONS

When buying any protective equipment . . . always ask for a FIBRE-METAL *product!*

FIBRE-METAL PROFITABLE PROTECTIVE PRODUCTS SINCE 1919

THE WORLD'S LARGEST MANUFACTURER OF QUALITY PRODUCTS FOR WELDING

Sold Everywhere thru leading Distributors and Dealers

THE FIBRE-METAL PRODUCTS CO.
CHESTER, PENNSA.

Helmet liners

58 WASHABLE "Winterizers" for cold-weather use with welding helmets, safety caps, etc. are of strong, sanforized twill, lined with soft napped flannel. "Colcap" protects top of head; "Frigicap" covers head and ears.

JACKSON PRODUCTS, INC.

* * *

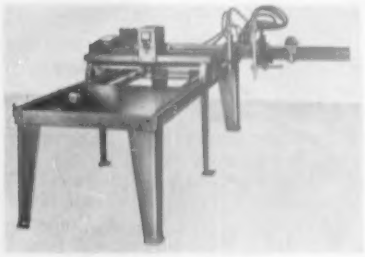
Hardfacing electrode

59 MANUFACTURER claims deposits from this new hardfacing electrode work harden to 48-50 Rockwell C. Applicable with a-c or d-c welders, the electrode is an alloy of chromium, manganese and nickel. It is particularly designed for both abrasion and impact wear resistance on manganese steels and high-carbon steels.

It can be used as a base for hardfacing alloys or be applied directly as a work-hardenable, wear-resistant overlay. As-welded properties: tensile strength, 125,000 psi; elongation, 19% in 2 in.; hardness, 26-32 Rockwell C. Available in 1/8, 5/32 and 3/16-in. core sizes.

ALL-STATE WELDING ALLOYS CO., INC.

* * *



Cutting machine

60 "CORTA 52" cutting machine has standard dimension of 40 in. in width and 80 in. in length. Included are a magnetic tracing head and a manual tracing head, as well as an automatic circle-cutting attachment. This multiple-torch machine can be used for stripping extra long plates or cutting intricate shapes, according to manufacturer. Current specifications: 110 or 220 volts, single phase, 60 cycles.

THE BURDETT OXYGEN CO.

Brazing flux

61 FIVE new fluxes have been designed to protect base metal and promote flow of silver brazing alloys up to a temperature of 1,750 F. Manufacturer states their development will permit use of low silver content alloys instead of expensive high silver grades. Further claims: flux efficiency will outlast the longest heating cycle, and the great reduction in cost of filler metals will reduce production costs.

"Eutector T" fluxes are said to exhibit almost 100% wetting of all mating surfaces, reduce surface tension, and thus improve capillarity.

EUTECTIC WELDING ALLOYS CORP.

* * *

Cutting torch

62 DESIGNED for light work, a completely new cutting and gouging torch uses electrodes up to ¼ in. in diameter. Known as "Model G-2," the torch operates from an ordinary d-c welding machine and a compressed air line. It removes defects in castings or forgings, cleans roots of welds and removes welds. It grooves, bevels or cuts mild and stainless steel, hard alloys, brass, bronze, Monel and cast iron. Groove left by torch is said to be ready to receive the weld, without further preparation.

ARCAIR CO.

* * *

Safety spectacles

63 LIGHTWEIGHT industrial safety spectacles called "Styl-Ize" combine shatterproof corrective lenses of new material called "Optilite" and distinctive color styling in the frames. New lens material is not a glass or thermoplastic, but a formula of compounded resins. It is claimed to have greater strength than glass, with only half the weight. Scratch resistance is also greater, manufacturer states.

UNITED STATES SAFETY SERVICE CO.

* * *

Selenium rectifier

64 FOR high-temperature applications, a new selenium rectifier is designed to operate at same current loads and voltage up to 212 F as it does at room temperature.

FANSTEEL METALLURGICAL CORP.

Asbestos gloves

65 PROTECTIVE qualities are said to be increased in new line of "heat-foe" asbestos gloves and mittens. Manufacturer also claims they offer more comfort to wearer and reduce worker fatigue. Line includes regular asbestos gloves and mittens, leather-palm gloves and mittens and reversible and reinforced mittens.

MILLER PRODUCTS CO., INC.

* * *

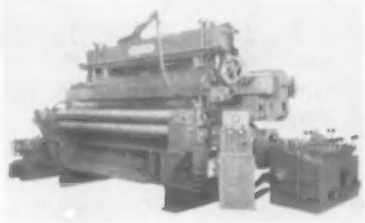
Electrode

66 ALL-purpose electrode is for welding mild steel. Manufacturer claims it forms a slag that is exceptionally easy to remove and that it is easy to handle in all positions over a wide current range. Known as "Sureweld CE," the electrode is classed as an E-6013 but exceeds specifications for this class in physical properties. Tensile strength of deposited metal is 75,000 to 85,000 psi. The electrode conforms to specifications of the principal codes for welding pressure vessels and boilers.

Available in seven sizes from 3/32 in. to 5/16 in. in diameter and in lengths of 12, 14 and 18 in.

NATIONAL CYLINDER GAS CO.

* * *



Welder-trimmer

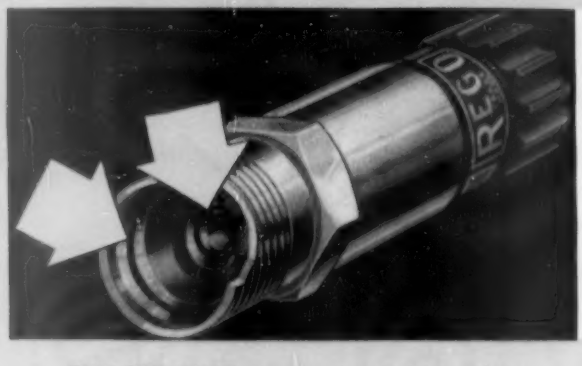
67 COMBINED welder and trimmer includes all essential features needed for convenient handling of coil ends or flat sheets into position for submerged-arc or gas-shielded welding. It incorporates welding and trimming weld bead from both sides, at one time, without unclamping or transferring the welded seam.

Unit is arranged for welding and trimming 10-ft-long seams in 1/16 and 1/4-in. stainless or other alloy sheets and strip.

MORTON MFG. CO.

Now, change tips with a twist of the wrist...

with the REGO* "GX" welding torch



THIS CUT-AWAY shows seating rings (arrows) in conical seating surfaces of the REGO "GX" head. Made of extra tough, long-wearing Neoprene, they assure a perfect gas-tight coupling of tip, mixer and head ... are easily and quickly replaceable when necessary.

New Neoprene Seating Rings make hand-tightened joints leakproof... reduce maintenance costs... lengthen torch life

You don't need a wrench to change tips on the new REGO "GX" Welding Torch. Thanks to Neoprene seating rings in the torch head, you get positive, leakproof coupling of tip, mixer and handle ... *with hand-tightening alone.*

There's no metal-to-metal contact ... no strain on threads ... no chance of damage to vital seating surfaces, even in dusty or sandy atmospheres. And because the seating rings absorb all normal wear and abuse, today's "GX" will last longer, torch head will never require costly re-seating.

Neoprene seating rings are just one of many sound reasons why the REGO "GX" continues to be your best buy in an all-purpose welding torch. Ask to see it now at your nearest NCG branch or authorized NCG dealer.

REGO "KXA" CUTTING ATTACHMENT

Doubles the usefulness of the REGO "GX" Welding Torch. Couples to the "GX" handle with a twist of the wrist to make an efficient cutting torch with capacity to 8-inch or greater thicknesses in steel. Available with either 75° or 90° bronze head.

*T. M. of the B. B. Co.

NATIONAL CYLINDER GAS COMPANY

840 N. MICHIGAN AVENUE • CHICAGO 11, ILLINOIS

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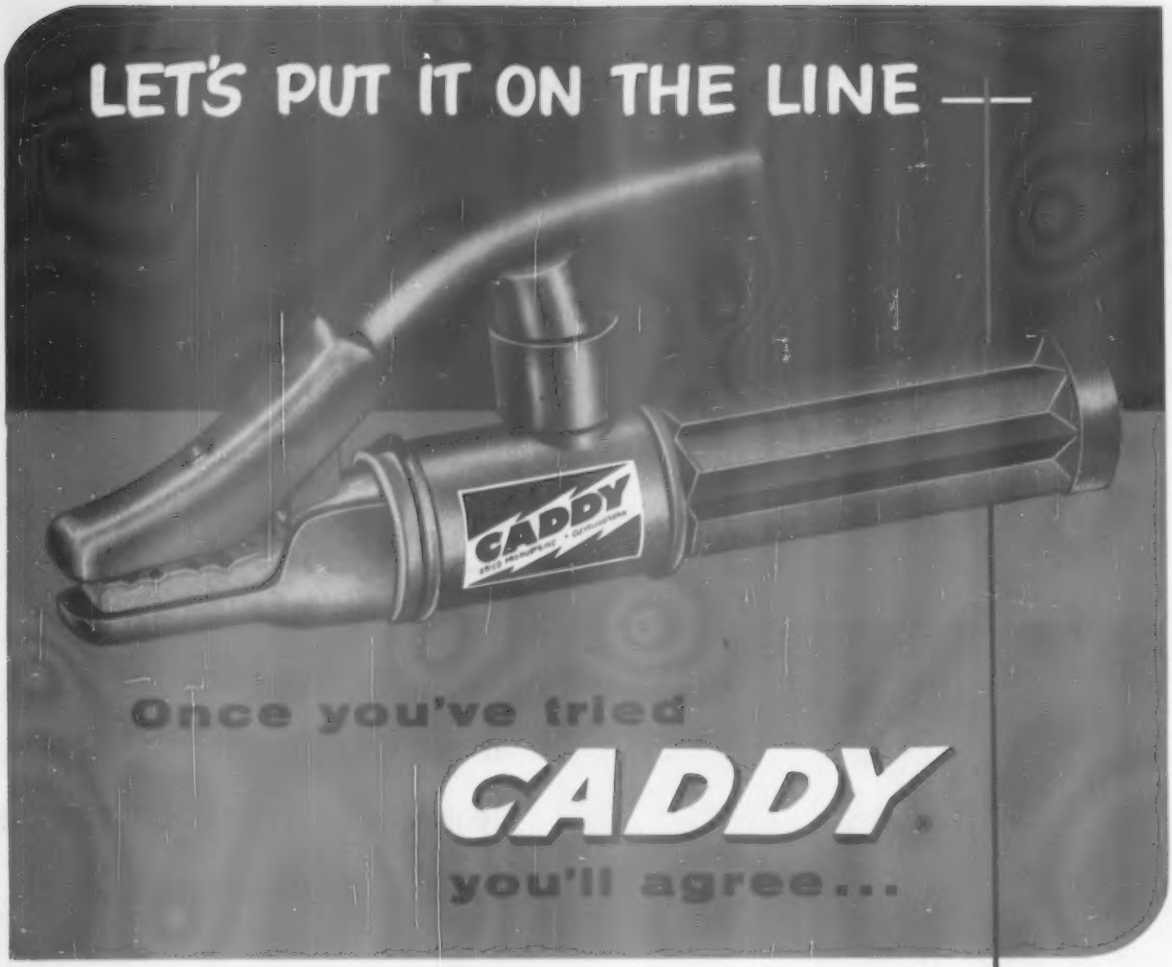
NCG

EVERYTHING FOR WELDING

LET'S PUT IT ON THE LINE —



It's the coolest, lightest, most durable electrode holder on the market.

For further information on the
CADDY TEST INSTALLATION PROGRAM
in your plant—write

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ERICO PRODUCTS, INC.
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CADDY | **ARC WELDING ACCESSORY DIV.**
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☐ I am interested in CADDY TEST INSTALLATION PROGRAM.
☐ Send CADDY CATALOG.

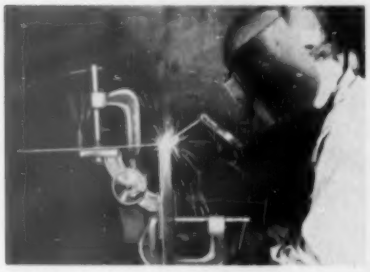
NAME _____ POSITION _____
COMPANY _____
ADDRESS _____
CITY _____ ZONE _____ STATE _____

Temperature indicators

68 "TEMPILAQ" ratings for 463 and 488 F have been added to this company's line of temperature indicators. This particular product is a liquid that is applied by daubing or brushing. It is said to dry quickly to a dull, opaque film. On subsequent heating, the coating will liquefy as soon as its temperature rating is reached. "Tempilaq" is now available in 12½-deg steps from 113 to 500 F and in 50-deg intervals from 500 to 2,000 F.

TEMPIL CORP.

* * *



Weldor's work holder

69 ADJUSTABLE work holder holds two parts at any angle in a vise-like grip, according to manufacturer. The tool's two clamping faces are adjustable from zero through 180 deg and are precision mounted for perfect alignment, it is further stated. Adjustments are made by loosening the single machine handle and moving indicator to desired angle on dial.

Made from cast aluminum alloy, the tool is said to dissipate heat quickly and eliminate adherence of weld spatter.

JERGENS TOOL SPECIALTY CO.

* * *

Welding wire

70 IMPROVED line of welding wire for use with submerged-arc and other automatic welding methods has size tolerances held to 1/1,000 in., states manufacturer. Firmness is another feature claimed. Annealed and layer-wound in 100-lb coils, the wire is said to be ideal when a large number of similar parts is to be rebuilt or where considerable material is to be applied to a single part. For a-c or d-c operation.

MIR-O-COL ALLOY CO., INC.

there is something better about*

GULF-WELD

ELECTRODES

A COMPLETE LINE OF ELECTRODES

Mild Steel Electrodes

High Tensile Steel Electrodes

Cast Iron Electrodes

Hard Surfacing Electrodes

Bronze Electrodes

Tool Steel Electrodes

* *SUPERIOR WELDING QUALITIES*

. . . developed out of new techniques for easier, better, faster welding. GULF, with the most modern producing mill in the world — new plants built expressly for the manufacture of electrodes by the most advanced methods and machines known today — offers a complete line of welding electrodes and rods designed to provide better welds faster at lower cost, time after time. GULF, through the experience of its staff of welding engineers recruited from leading plants all over the world, has developed into this superior line of electrodes important new work qualities. Write today for literature and prices.

Gulf

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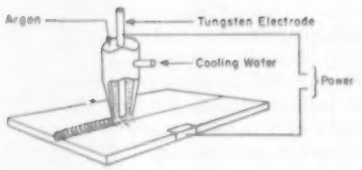
3 Modern Methods

BOOST...

- Production
- Profits
- Quality

Whatever your fabricating needs—in small shops or on production lines, on carbon steel, complex alloys or non-ferrous materials—LINDE has a high-speed, cost-saving electric welding process for every job. Here is the line-up of this top-notch team...



HELIARC Welding—*ideal for metals .020 in. and thicker*... Joins all commercial metals in easy operations—attains speeds over 100 inches per minute . . . Welding is done in all positions on all types of joints with portable manual, semi-automatic, and mechanized equipment.

There is no slag, spatter, or smoke—the operator can see and control the weld puddle at all times. Weld finishing is seldom necessary, and investment and maintenance costs are low.

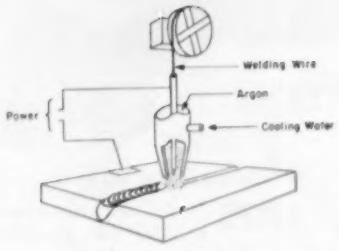
Linde Air Products Company
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.

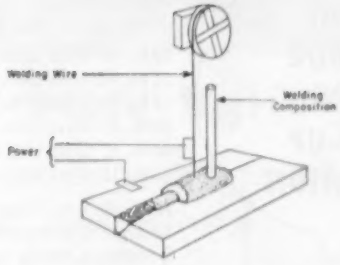
Offices in Other Principal Cities
In Canada: DOMINION OXYGEN COMPANY
Division of Union Carbide Canada Limited, Toronto

The terms "Heliarc," "Linde," and "Unionmelt" are registered trade-marks of Union Carbide and Carbon Corporation.

Linde Trade-Mark

For Joining Metals.....





Sigma Welding—*4 times faster wire deposition than by manual rod feed methods . . .* Full penetration up to ¼-in. in a single pass . . . Joins all commercial metals—and attains speeds of more than 100 inches per minute on many operations.

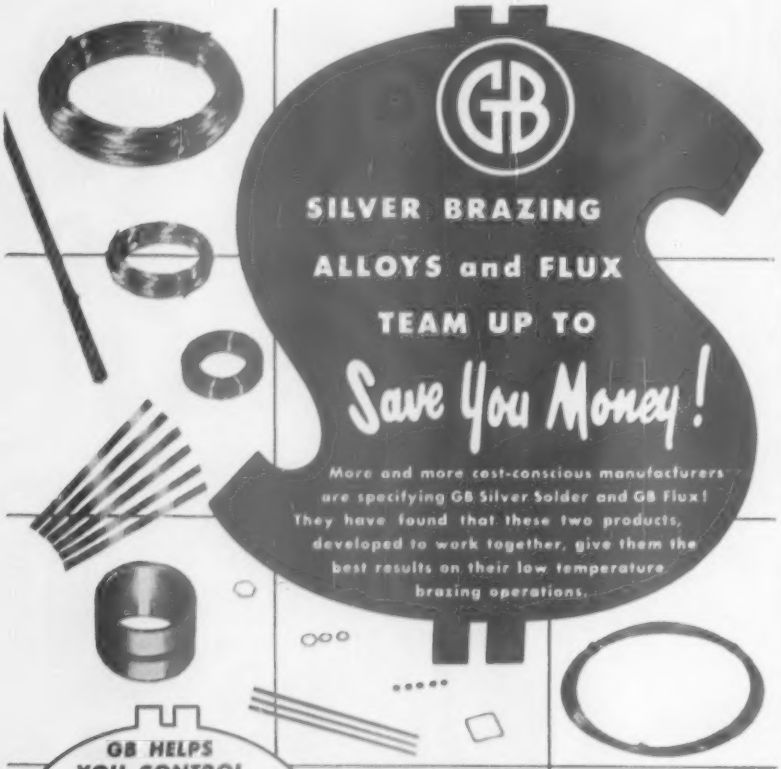
Uses any d.c., or c.p. (constant potential) power supply. With c.p., an operator has only to set the wire feed rate—current remains essentially constant throughout welding. Both manual and automatic mechanized sigma welding equipment is easy to operate and maintain.

UNIONMELT Welding—*joins metal of any thickness . . . Up to 3-in. thick in one pass.* Extreme depth of penetration and high rate of wire feed make this the fastest and usually the most economical of all welding processes. Deep penetration or wide shallow beads are easily attained by UNIONMELT welding.

Both portable manual and mechanized setups are available, and can use any a.c., d.c., or c.p. (constant potential) power supply. With c.p., no control is necessary to maintain constant arc voltage throughout welding.

Start Saving Now — Call Your Local LINDE Representative Today . . .

Ask for Form 7942, "Modern Methods of Joining Metals."


SILVER BRAZING
ALLOYS and FLUX
TEAM UP TO
Save You Money!
More and more cost-conscious manufacturers are specifying GB Silver Solder and GB Flux! They have found that these two products, developed to work together, give them the best results on their low temperature brazing operations.

GB HELPS YOU CONTROL THESE COST FACTORS!

SPEED
HEATING
MATERIAL
LABOR
CLEANING
FIT-UP
PREPARATION

GB Silver Solders are available in six standard alloys—each developed to meet specific cost and production requirements. All are available in the most convenient form to meet your needs—wire coils or straight lengths, strips, sheets or formed pieces.

GB No. 50 Silver Solder, melting range 1160-1175°F
GB No. 50N Silver Solder, melting range 1240-1260°F
GB No. 45 Silver Solder, melting range 1125-1145°F
GB No. 41 Silver Solder, melting range 1125-1160°F
GB No. 35 Silver Solder, melting range 1130-1270°F
GB No. 31 Silver Solder, melting range 1130-1300°F

And, if you require a special Silver Solder, Goldsmith's Technical Service Division is ready to give you competent assistance—their recommendations will be backed by 80 years of experience in alloying and refining precious metals.

GB FLUXES

Produced under strict laboratory control, GB Fluxes are fully active, deep penetrating, stable and economical. While developed primarily for use with GB Silver Solders, they produce high quality joints with any good silver solder.

GB DATA BOOK

Here's down-to-earth information on the important phases of low temperature brazing. You can get a free copy from your GB Distributor—Write us and a copy will be forwarded to you.

GOLDSMITH BROS. SMELTING AND REFINING CO.
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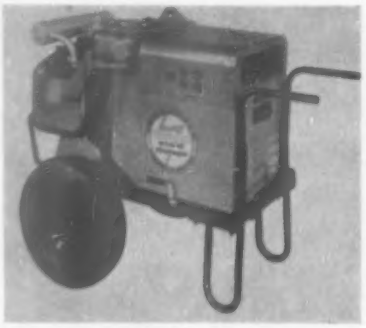
Suppliers of Precious Metals to Industry Since 1867



Welder-power plant

71 "Porto-Arc" is the name of a new gas-driven a-c welder and all-purpose power plant combination. It gives up to 200 amp of welding current at 100% duty cycle plus a power source of 4½ kw at 110-220 volts. According to manufacturer, this low-cost and versatile unit is economical to operate and maintain. It is offered as a welder only or as the welder-power plant combination.

Marquette Mfg. Co.

* * *

Grinding wheel

72 New "BZ" disc wheels are said to offer new portable grinding advantages in three ways: (1) super strength to stand heavy-duty grinding; (2) availability in range of grades; and (3) durability in all grades, giving longer wheel life.

Manufacturer claims greater strength comes from wheels' resinoid bond construction and multilayer reinforcement of fibre glass plus specially treated Nylon mesh.

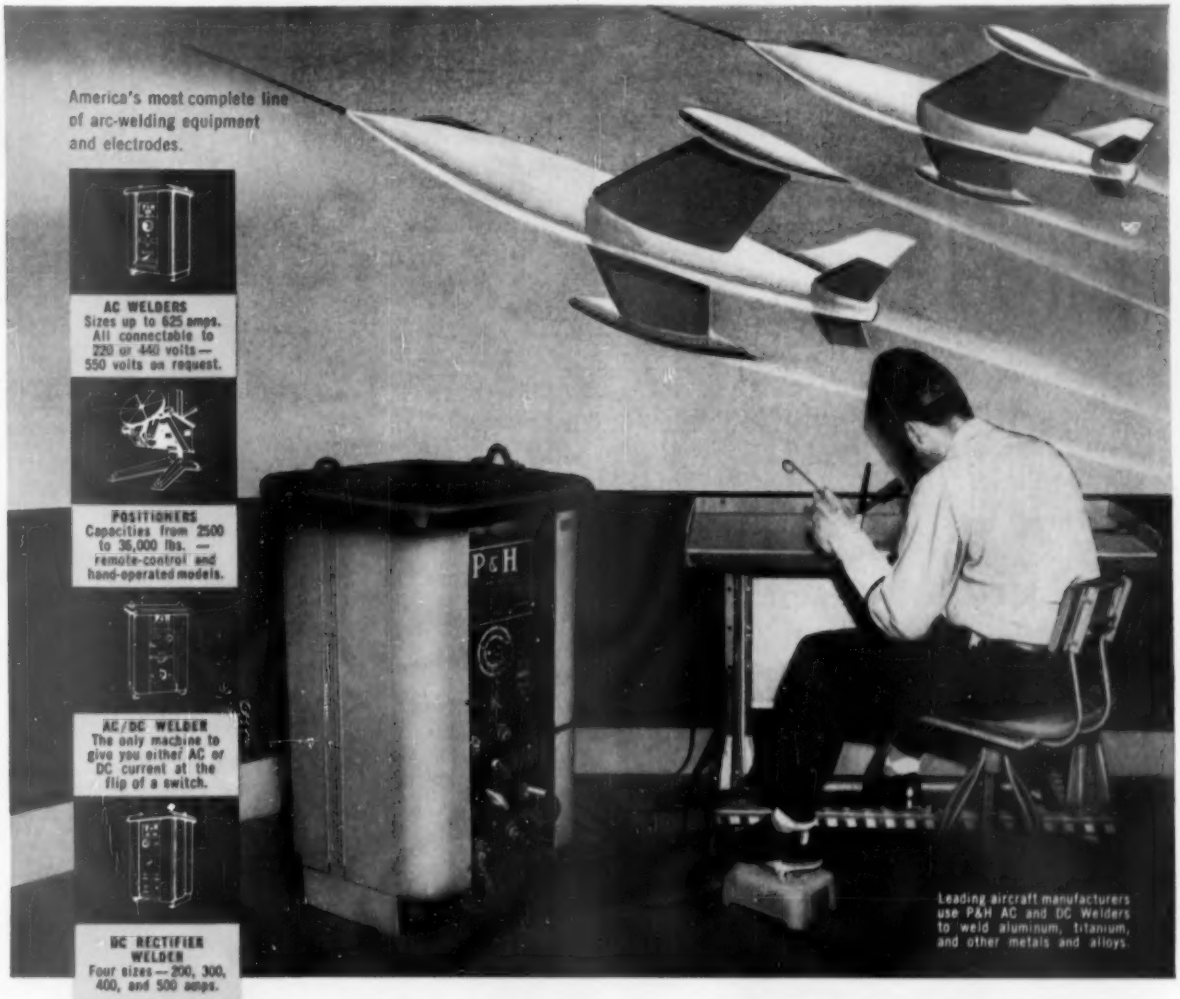
Bay State Abrasive Products Co.

* * *

Dial caliper

73 Made of wear-resistant stainless steel, new "Dial-Cal" is first caliper to replace vernier scales with direct reading dial, according to manufacturer. It incorporates four modes of measurement: ID, OD, knife-edge (for recesses) and depth.

Precision Tool Sales.


America's most complete line of arc-welding equipment and electrodes.
AC WELDERS
Sizes up to 625 amps. All connectable to 220 or 440 volts — 550 volts on request.
POSITIONERS
Capacities from 2500 to 35,000 lbs. — remote-control and hand-operated models.
AC/DC WELDER
The only machine to give you either AC or DC current at the flip of a switch.
DC RECTIFIER WELDER
Four sizes — 200, 300, 400, and 500 amps.
ELECTRODES
For mild steel, cast iron, "hard-to-weld" steels, stainless steels, hard surfacing.
P&H
Leading aircraft manufacturers use P&H AC and DC Welders to weld aluminum, titanium, and other metals and alloys.

.5" plate or .005" light-gauge

—you can weld both with the same P&H AC or DC machines

Does the job call for 475 amperes or just 2 amperes? It makes no difference — you can get either current with your P&H — and any heat in between.

Dial-lectric Instantaneous Control is the reason. It's an exclusive P&H feature that gives you finger-tip heat control right at the work.

To select your current, you simply turn a radio-type knob (or step on a foot treadle). That adjusts heat instantly and accurately — for faster, better welds, even on thin-gauge material. Arc-striking is fast and easy — and the arc is unusually stable.

There are no hard-working cranks to turn; no moving parts to cause delays or maintenance expense.

There are other advantages you get with P&H AC and DC Welders — advantages that help you boost production, cut costs, save time. Ask your P&H representative or distributor for all the facts. Or write for latest bulletins.

P&H WELDING DIVISION
HARNISCHFEGER CORPORATION
4513 WEST NATIONAL AVE. • MILWAUKEE 46, WIS.

the P&H *Line*

TRUCK CRANES · DIESEL ENGINES · POWER SHOVELS · PREFABRICATED HOMES · HOISTS · SOIL STABILIZERS · WELDING EQUIPMENT · OVERHEAD CRANES

P&H welding equipment is manufactured and sold in Canada by REGENT EQUIPMENT MANUFACTURING COMPANY LTD., 455 King Street West • Toronto, Ontario, Canada

saves you money

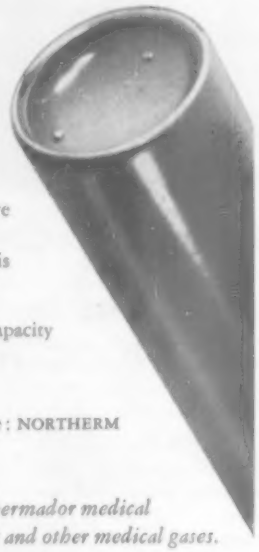
Norris-Thermador deep-drawn cylinders are curled under to form a heavy-duty built-in rolling surface that is even, strong, and permanent. *You save* because there is no rolling ring to lose or dent. Cylinders stand together evenly in transit. Further economies: cylinders are up to 10% *lighter* and fill faster than other monolithic filler type cylinders. And with Norris-Thermador's vast plant in the deep-water Port of Los Angeles, *you save* on overland freight.

NORRIS-THERMADOR

acetylene cylinders

precision-made

An exclusive and extremely accurate cold-draw process keeps shell weight to a constant thickness — with maximum thickness and strength in the cylinder shoulders. Excess weight is eliminated. *In addition, all welding is X-ray controlled.* Norris-Thermador cylinders meet or exceed ICC specification 8. (Cylinders are also made to Canadian Board of Transport Specifications. A disinterested inspection agency is available as required for these cylinders.)



Acetylene Cylinders from 10 to 300 cubic foot capacity

early shipment

Write or wire for specifications on all sizes. Cable : NORTHERM

Ask about precision-made Norris-Thermador medical cylinders for oxygen, nitrous oxide and other medical gases.

NORRIS-THERMADOR CORPORATION
5215 South Boyle Avenue, Los Angeles 58, California

Please send me illustrated cylinder specification sheets.

Name_____

Address_____

City_____ Zone____ State_____

WE-155

3-954

Induction heater

74 COMPLETE line of motor-generator equipment for all induction-heating applications was recently announced by the High Frequency Division of this firm. Now available is equipment for m-g set frequencies of 1 kc, 3 kc and 10 kc. Generators are available in power outputs from 30 kw to 1,250 kw.

LINDBERG ENGINEERING CO.

* * *

Mig spot welder

75 MANUAL Mig (metal inert-gas) spot welder makes spot, plug and tack welds with addition of reinforcing filler metal. It requires access to only one side of weld joint. A consumable wire electrode is fed automatically into the weld area, and filler metal is claimed to make a 100% penetration in the lapping metals. Pistol-like welder is designed to operate most efficiently with a constant-potential power supply.

LINDE AIR PRODUCTS CO.

* * *

Water control

76 CHECK and needle valves in improved "Water Mizer" have been redesigned to allow greater water flow through bypass port. A neon pilot light has replaced former incandescent light, and thermostat is now adjustable. "Model ET-101" is said to save water on all water-using parts of welder, including new thermostat-type ignitrons.

VAN VOOREN PRODUCTS.

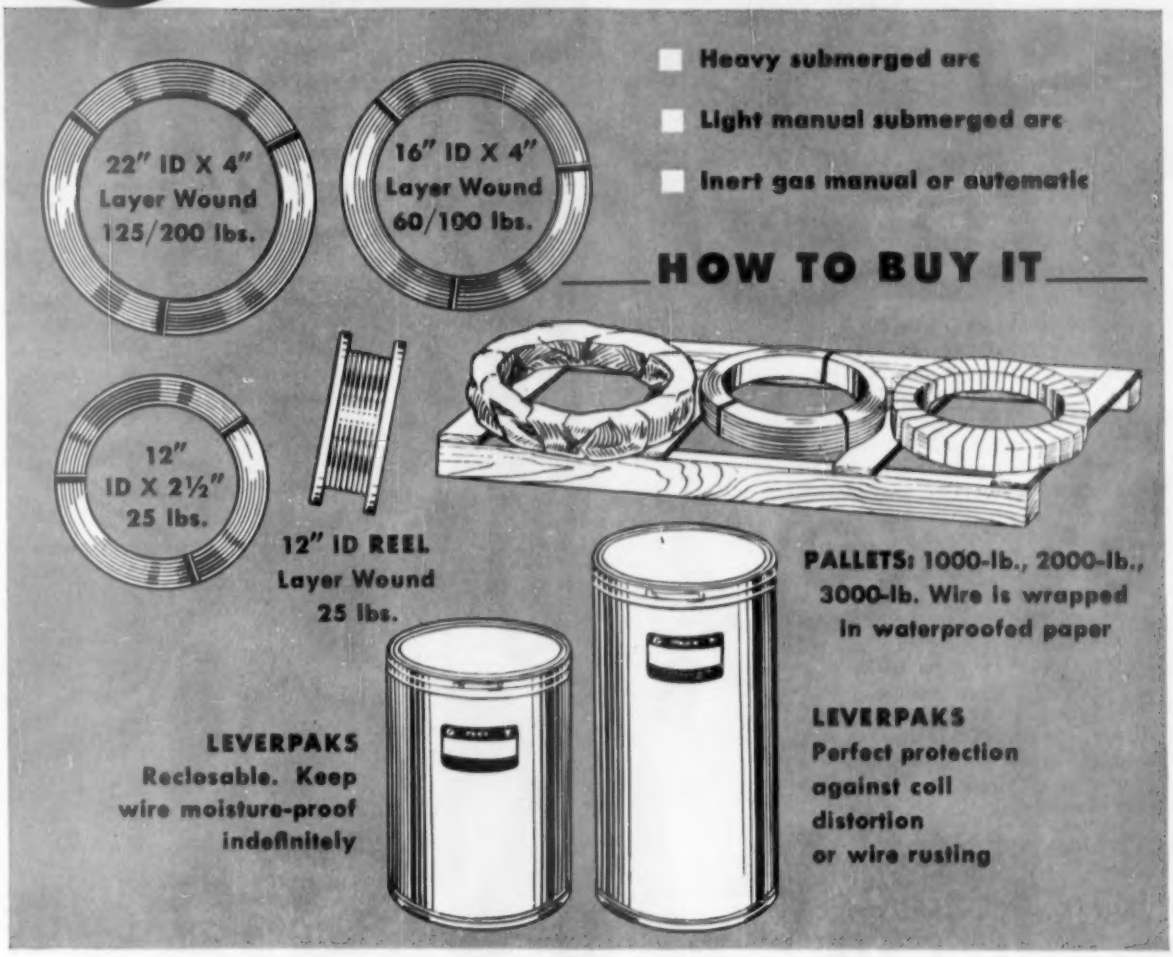
an ACCO product

Page Welding Wire

PAGE CHECK-OFF

Check the welding wire you use:

- ☐ Heavy submerged arc
- ☐ Light manual submerged arc
- ☐ Inert gas manual or automatic


22" ID X 4" Layer Wound 125/200 lbs.
16" ID X 4" Layer Wound 60/100 lbs.
12" ID X 2½" 25 lbs.
12" ID REEL Layer Wound 25 lbs.
HOW TO BUY IT
PALLETS: 1000-lb., 2000-lb., 3000-lb. Wire is wrapped in waterproofed paper
LEVERPAKS Reclosable. Keep wire moisture-proof indefinitely
LEVERPAKS Perfect protection against coil distortion or wire rusting

CARBON STEEL • Any carbon from Armco (.025 max.) to high carbon (.90-1.10). All standard AISI analyses in between.

LOW ALLOYS • All the most popular welding grades.

STAINLESS • AISI—308, 309, 310, 316, 347, 410, 420, 430 and 502. Other types on request.

• PAGE also offers all of these analyses for oxyacetylene gas welding, metal spray wire, or bare electrodes.

***Write** today for detailed literature and prices*

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Page Steel and Wire Division
AMERICAN CHAIN & CABLE

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Gas • Automatic • Arc

Is your welding problem distortion, embrittlement, cracking or damage to base metals . . . or the other dangers of welding with conventional high heat methods and materials? These problems have been solved!

YOUR EUTECTIC DISTRICT ENGINEER CAN SHOW YOU HOW

. . . the "Low Heat Input" metal joining process helps your maintenance man . . . who usually has only one chance to get a perfect weld to avoid downtime, delays and replacement . . . and who has for 15 years proved the value of Eutectic "Low Temperature Welding Alloys" for both maintenance and production.

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EUTECTIC
WELDING ALLOYS

ARE "BETTER, FASTER, CHEAPER"

Write today for a free "showing" of Eutectic's exclusive "Low Heat Input" metal joining process by your District Engineer . . . or a free copy of the illustrated booklet "How To Overcome Your Welding Problems And Improve Your Welding Techniques" (TIS 2268).

EUTECTIC WELDING ALLOYS CORPORATION
172nd STREET and NORTHERN BOULEVARD, FLUSHING 58, NEW YORK

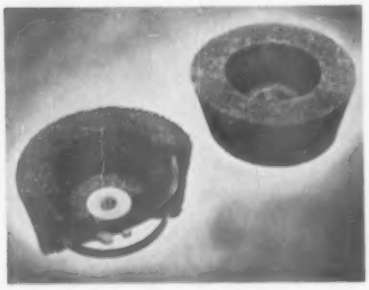
Paste solder

77 PASTE solder, called "SweTite," consists of a blend of powdered solder and an active flux and is for sweat soldering and tinning. Cleaning is unnecessary in most applications, manufacturer claims. Paste is applied with brush, parts fitted together and heat applied. Small amount of flux residue can be removed by wiping joint with damp cloth. Joints obtained by this method are said to be as strong as those obtained by conventional soldering methods.

"SweTite" is supplied in ½ and 1-lb cans, with free brush for each can.

ALPHA METALS, INC.

* * *



Grinding wheel

78 SAFER grinding is said to be result of two "Grind-Away" rings embedded directly in the usable portion of this firm's new grinding wheel. These rings have greater tensile strength than steel but at the same time will abrade away during the normal cutting of the wheel without any interference to grinding action. Manufacturer says this makes is possible to reinforce the wheel where it is really needed.

Tests run on this wheel show that cracked wheels have been run up to 20% above normal operating speed without wheel exploding. This safety feature has been extended at present only to straight wheels and three types of cups for portable grinders.

COLONIAL ABRASIVE PRODUCTS CO.

For more information use card on page 81

NOW... you can do 101 cutting jobs.

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AMAZING!

NEW!

BURDOX Beaver

Portable Cutting Machine

MOST POWERFUL... MOST EFFICIENT CUTTING MACHINE IN ITS SIZE CUTS UP TO 4" WITH EASE

STRAIGHT LINE CUTTING using angle iron to support grooved roller guide wheels.

BEVEL CUTTING is performed as above with torch set at angle from plus or minus 45°.

CIRCLE CUTTING using radius rod with adjustable compass point centering on any radius from 13 16" to 22".

SHAPE CUTTING by manually guiding the machine along any desired shape.

THE BURDOX BEAVER is portable, lightweight, versatile cutting machine. It is, in fact, a POWERED TORCH with performance equal to many larger, stationary types, though retaining many of the advantages of a manual cutting torch. Its unusual features and trouble-free operation make it an ideal unit for both special jobs and production runs.

The entire machine weighs only 16 pounds, making it easy to handle while reducing the possibility of operator fatigue. Almost anyone can operate the BURDOX BEAVER because of its simplicity. It will cut in a straight line or bevel, cut circles and shapes with equal ease. The cutting range is from ⅛" to 4". Power is by means of a 110 volt, 60 cycle motor.

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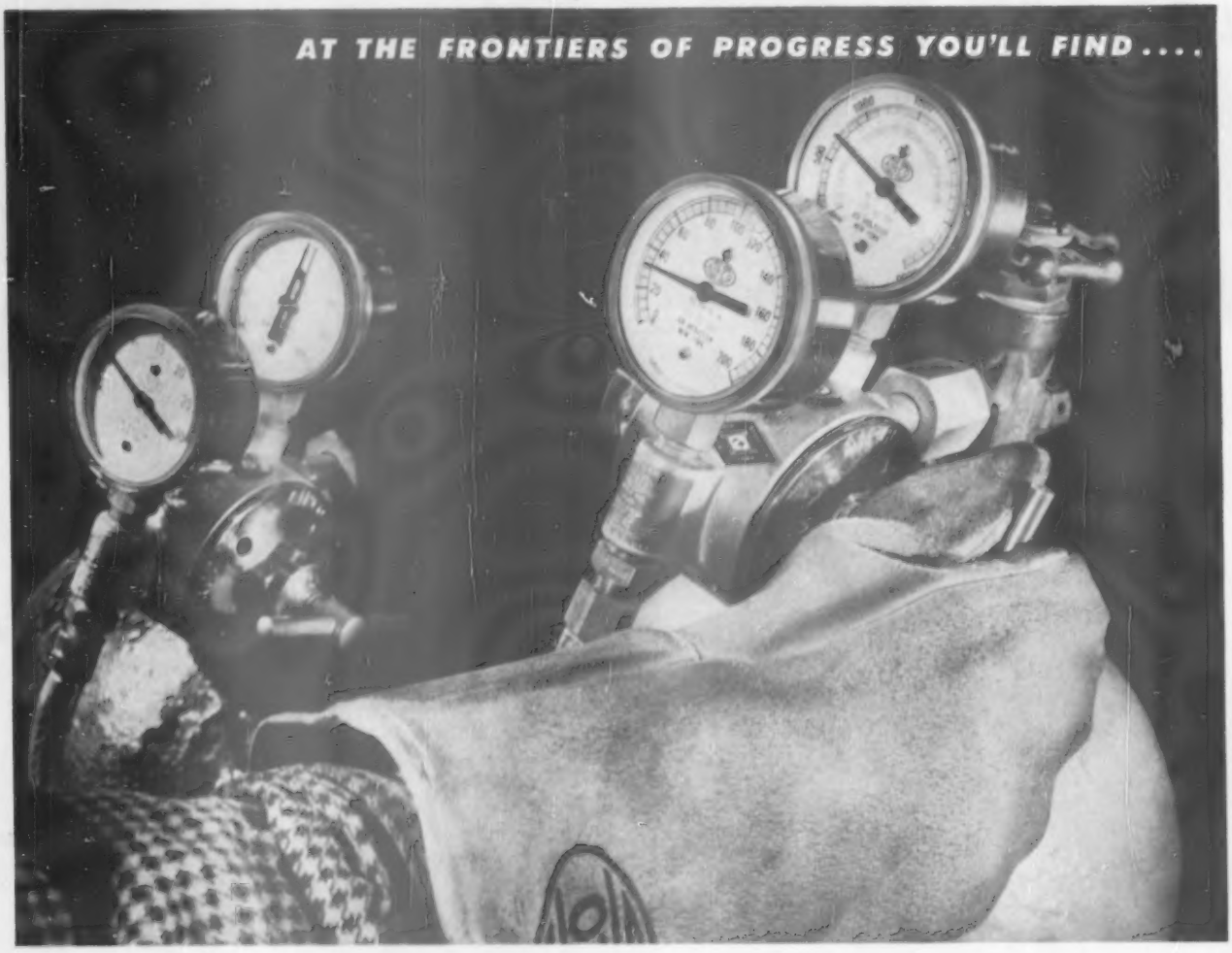
ARC WELDING EQUIPMENT

GAS WELDING EQUIPMENT

SPOT WELDING EQUIPMENT

SAFETY EQUIPMENT

ACCESSORIES



cut production time with AIRCO REGULATORS

that you set...and forget!

Airco two-stage regulators require but one adjustment . . . the first. Once set at the correct operating pressure they deliver a constant, non-fluctuating flow of gas from start to finish of cylinder discharge. Drops in pressure are automatically compensated for. Thus, an operator can devote his full attention and skill to the job at all times – speeding production – reducing costs.

Similarly Airco produces station regulators designed to operate on low-pressure pipe line systems which provide uniform gas pressures wherever required. Here, too, a single setting eliminates the necessity of frequent, time consuming readjustments.

Over two million Airco regulators have been purchased through the years. You'll discover that the inherent advantages of these Airco-engineered products make their initial cost a wise investment for long years of quality, trouble-free service. For detailed information and literature, contact your local Airco Representative, authorized dealer, or write Airco direct.

AIRCO

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60 East 42nd Street • New York 17, N. Y.

Divisions of Air Reduction Company, Incorporated, with offices in most principal cities

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Products of the divisions of Air Reduction Company, Incorporated, include: AIRCO – industrial gases, welding and cutting equipment, and acetylenic chemicals • PURECO – carbon dioxide, liquid-solid ("DRY-ICE") • OHIO – medical gases and hospital equipment • NATIONAL CARBIDE – pipeline acetylene and calcium carbide • COLTON CHEMICAL COMPANY – polyvinyl acetates, alcohols and other synthetic resins.

AN AIR REDUCTION PRODUCT

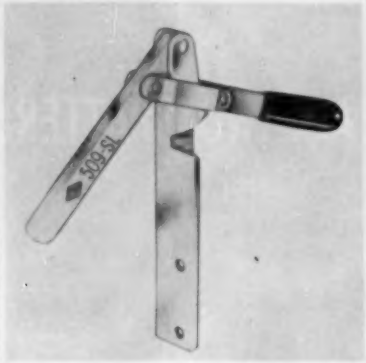
AIRCO items for cutting and welding

AIRCO OXYGEN – 99.5% pure for maximum speed, economy and efficiency in welding, cutting and other flame processes. Available in trailers in quantities up to 40,000 cubic feet, and in the standard 244 or 122 cubic foot cylinders.

AIRCO ACETYLENE—when burned with Airco oxygen gives an exceptionally high temperature flame (6300°F). This extreme heat makes it superior to all other fuel gases for welding and cutting. As in the case of oxygen, you are always assured of a convenient local supply when you deal with Airco.

AIRCO "45" and "45M" tips for faster machine gas cutting and narrower kerf. Available in 8 sizes for cutting metal up to 8 inches in thickness. Airco "45M" has some basic features of the "45" tip but is designed for heavier preheat and is particularly adapted to bevel cutting, cutting rusty and scaly steel, and cutting with hydrogen as a fuel gas.

The Airco line includes a wide variety of multiflame tips, flexible tubing and extensions to put the flame just where you need it. There are tips for flat descaling, flame heating, automatic silver brazing set-ups . . . also a tip that gives a paint brush type of flame that's perfect for small tubing. *Write for literature on these items.*



Clamps

79 Two new clamp models, designated "509-U" and "509-S", are called, "fixture framers" and "forty-fivers." The former name applies to their angular-flange base, which permits easy mounting by bolts or welding to side of fixture. The latter term is applied because, when mounted vertically to side of fixture, the holding bars flop completely over the side to produce a firm clamping action at a 45-deg angle directly against upright fixture base.

These clamps weigh 13 oz and both models are provided in right and left-hand styles. Holding pressure of the "S" model is 500 lb, of the "U" model, 375 lb.

DETROIT STAMPING CO.

* * *

Low-hydrogen electrode

80 IRON powder has been incorporated into the coating of a new low-hydrogen electrode called "Atom-Arc." This makes possible the use of higher welding currents with either a-c or d-c, which increase the number of pounds of weld metal deposited per hour. The electrode is available in strength levels and chemistry of the 7016, 8016, 9016, 10016, and 12016 AWS grades. They are packaged in 50-lb hermetically sealed, all-metal containers.

ALLOY RODS CO.

* * *

X-ray generator

81 VAN de Graaff model X-ray generator of 1,000,000 volts is said to be the first supervoltage X-ray equipment in the price range of conventional X-ray apparatus. The unit is self-contained in a pressure vessel 36 in. in diameter by 50 in. long. It weighs less than 2,500 lb. Exposure time through 1½-in. steel is less than 1 minute; up to 4½-in. steel in half an hour. Unit is easy to set up; only 2 kw of 220-volt, 3-phase power required.

HIGH VOLTAGE ENGINEERING CORP.

It's the CONNECTION that counts!

cam-lok cable connectors proved:

"LOWEST RESISTANCE OF ALL TESTED!"

1 "Connects" easily and tightly
2 "Disconnects" easily and quickly
3 Gives positive contact
4 Insures time and money-saving interchangeability
5 Eliminates arcing and burning

With the same cable, current carrying ability is limited only by the connectors. That's why a noted welding equipment manufacturer tested various makes of connectors. Under a 400 ampere load, the Cam-Lok Connector showed negligible resistance . . . only 10.6 millivolt drop . . . lowest of all connectors tested! Are connectors the weakest link in your welding lines? Get Cam-Lok. The Double-Cam principle assures most perfect contact possible. The simple, solid brass, precision machined parts are trouble free, even on construction work. Just two interchangeable sizes connect all cables from 1 through 4/0.

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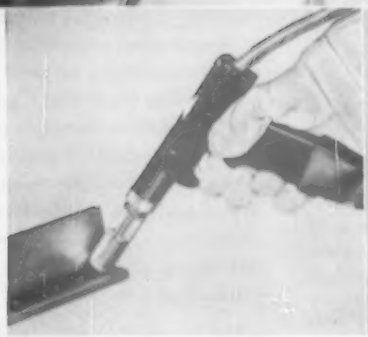
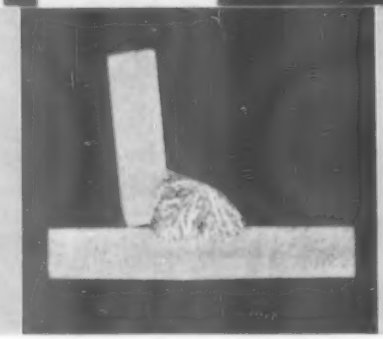
DIVISION OF EMPIRE PRODUCTS, INC.
P. O. Box P-98, CINCINNATI 36, OHIO



Close-up of WEST-ING-ARC gun welding fillet. Note complete absence of slag or spatter. Special nozzle design reduces inert gas consumption.

Completed fillet weld. Once took 50 seconds plus cleaning time. With WEST-ING-ARC, job finished in 24 seconds. See how clean and smooth the finished weld is.



Cross sections above show good penetration, uniformity and nonporous nature of welds made with WEST-ING-ARC, new Westinghouse MIG welding process.

FACT: WEST-ING-ARC, new MIG* process for welding mild steel. Welds up to 30% faster; saves up to one half the cost.

FACT: Field tests show 15-30 percent faster speeds at 25-50 percent less cost than with manual or semiautomatic MIG methods. You can manually deposit one-quarter-inch butt welds at 30 inches per minute . . . one-quarter-inch lap and fillet welds at 20 inches per minute . . . on hot or cold-rolled steel.

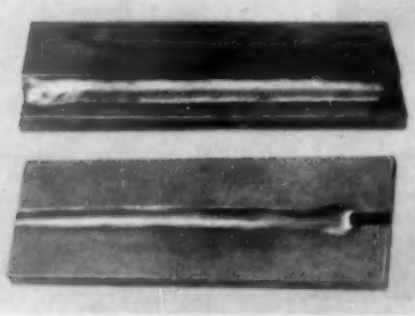
FACT: WEST-ING-ARC MS-20 Wire overcomes arc instability, spatter and poor quality welds. Straight polarity (work positive, electrode negative) means faster electrode burn-off rate, faster welding speeds.

FACT: Welding time is reduced to a fraction. Less inert gas (argon) is consumed because of stabilized arc. There is good penetration for X-ray quality and high-strength welds. Mild steels welded without special surface preparation—with absence of wasteful spatter or slag . . . no cleaning.

See for yourself how WEST-ING-ARC can increase your weldment production. Make a date with *The Man With The WEST-ING-ARC Facts*—your Westinghouse welding specialist. Or send in coupon below for complete information. J-21864

*MIG: metal inert gas

YOU CAN BE SURE... IF IT'S
Westinghouse



Lap and butt welds are easy, too. These mild steel samples were welded without preliminary preparation, can be painted now without cleaning.

WESTINGHOUSE ELECTRIC CORPORATION
Welding Dept., P. O. Box 868, Pittsburgh 30, Pa.

☐ Send complete WEST-ING-ARC literature

☐ Have Westinghouse welding specialist call

Name _____ Title _____

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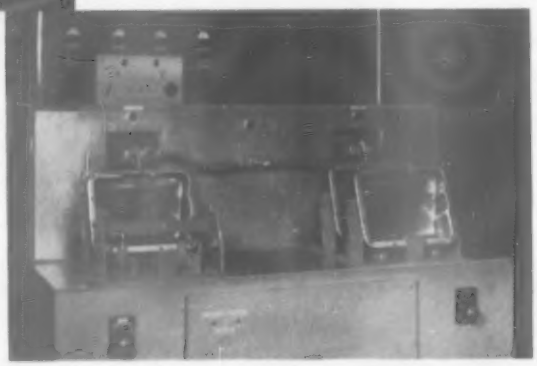
W.E. 1-55

A prize recipe
FOR BRAZING SPUDS

The principal ingredient is the low-temperature silver brazing alloy EASY-FLO. You simply place the spud in position with a ring of EASY-FLO wire around it, apply flux and heat. Logan Machine & Metal Stamping Co., Akron, Ohio, get excellent results with this recipe in brazing spuds in the oil pans that are part of an automatic automobile drive. Photos show how they do it.

Pans with spuds and EASY-FLO rings are placed in fixtures of 2-station induction heating unit. Brazing two at a time, production is 400 an hour. Under a 100-lb. torque test "the pan pulls apart first."



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It gives you tried and proved recipes for fast, low-cost metal joining that never fail. Write for a copy today. Ask for BULLETIN 20.

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Torch

82 LIGHT-duty torch has rated cutting range to 1 in., but it can be used to cut 2½-in. steel. "Aircraft" combination torch weighs 14 oz, is 12⅜ in. long as a complete cutting torch. As a welding torch, it weighs but 6¼ oz, is 10¼ in. long. Welding range is up to ¼-in. plate.

Other features claimed: quick changeover of tips without using wrench; positive flashback resistance; protection of all critical seating surfaces. Available with swaged or separable welding tips.

THE K-G EQUIPMENT CO. (INC.)

* * *

Hose connectors

83 TWO new types of hose connectors are made of forged flanges and fittings fabricated from aluminum. Loose-flange type connector consists of a long lap joint stub end and a loose back-up flange. Barrel of the stub end is provided with rings to anchor the hose. The flange may be freely rotated without lifting heavy hose, thus easing strain on workers. The integral-type connector consists of a welding neck flange welded to a pipe nipple equipped with welded anchor rings.

TUBE TURNS.

* * *

Weldors' gloves

84 BETTER-quality cowhide and softer leather have made it possible to produce two pairs of gloves at low cost, according to manufacturer. This new leather is said to be stronger, will withstand more heat with less shrinkage. It comes in a new color—auburn brown. The two new glove models are designated "No. 746" and "No. 739."

JOHN TILLMAN & CO.

For more information use card on page 81

for faster,
cleaner, sounder welds use
CRUCIBLE STAINLESS ELECTRODES...

You're *sure* of fast deposition, uniform quality welds, with Crucible stainless steel electrodes. For Crucible pioneered in the *development* of stainless electrodes . . . and its welding engineers have a wealth of manufacturing and application experience for you to draw upon.

And you'll find a complete assortment of Crucible stainless bare welding rods and coated electrodes for both AC and DC welding . . . including special high carbon corrosion- and heat-resisting electrodes . . . armorize electrodes for armor plate welding . . . and electrodes for cast iron welding.

Whatever your application . . . whatever welding procedure you use . . . there is a Crucible stainless welding wire or electrode for the job. You'll get them *fast* from your nearest Crucible warehouse or welding equipment distributor. *Crucible Steel Company of America, Henry W. Oliver Building, Pittsburgh 30, Pa.*

CRUCIBLE first name in special purpose steels

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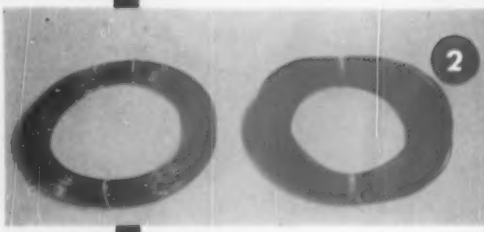
Makes Low Temperature Brazing Easier 3 BIG WAYS

1 **IDENTIFICATION FOR INVENTORY CONTROL**

Easier to identify for alloy, size, exact weights and laboratory inspection number. Packaged for protection against dirt, oxidation and other contamination.



2 **CLEANEST COILS MADE**

Compare SIL-BOND coils with any other brand for purity, cleanliness and uniformity of temper . . . comparison is SIL-BOND's best salesman! (SIL-BOND COIL at left. Other coil at right.)

3 **EASIER TO UNWIND**

SIL-BOND is better drawn, tighter coiled . . . so it unwinds easier, saves costly preparation time! Important in hand fed brazing . . . vital in automatic brazing!

SIL-BOND — *The Dependable Low Cost, Low Temperature Brazing Alloy!*

Better Because It's Made Better and Packaged Better!
Dependable United Product Analysis Makes The Brazing Difference!

ALWAYS Braze with SIL-BOND or PHOSON!
Ask for SIL-BOND Booklet NOW!

UNITED WIRE

Ask to see the new United Wire color film "When Metals are Brazed". Write for showing dates and literature.

Permanently United

AND SUPPLY CORP.
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Weldors' goggles

85 IMPROVED ventilation is primary feature claimed for "Model 500" welders' goggles. Air passages in side shields admit an indirect flow of air to the inner cup area but are angled and placed to prevent light penetration. Additional ventilation through wide channels between lens-retaining rings and cupwalls provides a direct flow of air to inner lens surface.

PENNSYLVANIA OPTICAL CO.

* * *

Hardening powder

86 "ROYAL" hardening powder is claimed to provide simplified method for quick-surface hardening of steel tools, dies, parts and cutting implements. Developed to replace cyanide, eliminating poisonous fumes, the compound is applied to areas heated to 1,400-1,700 deg with heat maintained 15 to 30 minutes, then quenched for desired temper. A 0.01 to 0.02 case depth is said to provide longer tool life without brittleness for low to medium carbon steels.

ANTI-BORAX COMPOUND CO.

* * *

Soldering kit

87 "Do-it-yourself" soldering kit includes 250-watt gun, ample supply of "Kester" solder, set of cutting and smoothing tips, double-end wrench and two instruction booklets. It comes packaged in metal carrying case. Features of the "Model 8250A" gun include 5-second heating, dual spotlights and instant trigger switch.

WELLER ELECTRIC CORP.

Miller Selenium Rectifier Type D.C. Arc Welders

. . . performance, dependability, ease of maintenance unmatched by any other! *Pulsating* direct current produces sounder, denser welds; minimizes magnetic arc blow and "arc-outs." SR Welders have wider ranges than any other D.C. welder; polarity reverses at the flick of a switch. Miller's patented UNITRAN *combines* transformer and flux diverter. Easily remote controlled or paralleled in combination with other SRs. Models with rated outputs (60% duty cycle at 40 volts) of 200, 300, 400 and 600 amperes.

Miller Heavy-Duty Industrial A.C. Arc Welders

These transformer-type welders achieve high-quality welds at maximum production speeds, feature low maintenance and long life. Ample open circuit voltage stabilizes arc, minimizes "arc-out" time, permits use of all A.C. or A.C.-D.C. electrodes. Continuous current control. Models 102, 103, 104, 105 and 106 rated at 200, 300, 400, 500 and 600 amperes respectively (60% duty cycle at 40 volts). Power factor correction at slight additional cost. Models 105-SA, 107-SA, 108-SA and 109-SA are specifically designed for submerged arc welding, have selective open circuit voltages for automatic welding. Rated secondary amperes (1 hour) are 500, 750, 1000 and 1500 respectively. All SA models are power factor corrected.

20% PLUS FACTOR

Engineer-earned designator for the basically better design, high-quality components, established efficiency and longer life of Miller welders. Complete FREE literature upon request. Get the facts TODAY!

Miller Rectifier Type Sigma Welder

Model SIGMA-5 maintains stable welding conditions regardless of arc variations. Operator can set wire feeding speed on SIGMA head and arc voltage on SIGMA welder. After arc is struck, Model SIGMA-5 automatically regulates filler wire speed and current to maintain constant arc length. Power for SIGMA head and control circuit furnished from within welder. May be paralleled and/or remote controlled. 500 ampere rated output on 100% duty cycle at 30 volts.

miller

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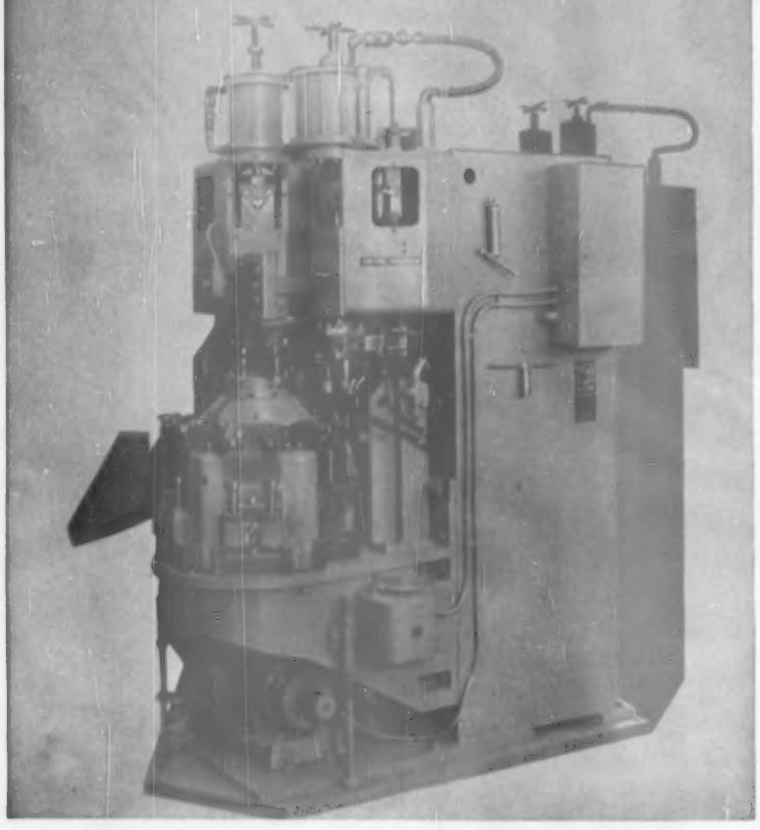
"Let's call in T.W."

"THEIR EXPERIENCE WITH AUTOMATION OF RESISTANCE WELDERS WILL COME IN HANDY ON THIS ONE"

● "What's the best method for automatically loading and unloading resistance welders?" . . . "Can the welders be made an integral part of the production line?" . . . "What mechanical devices can be employed to make resistance welders automatic?"

Automatic resistance welding may be the production key you have been seeking to improve your costs. By calling in T-W you will gain the benefit of their work with automation as applied to resistance welding. One recommendation by T-W application men may make the big difference in your costs. T-W has the facilities, the engineers and the reputation for the best in resistance welding.



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RESISTANCE WELDERS

THE TAYLOR-WINFIELD CORPORATION WARREN, OHIO

Soldering gun

88 LIGHTWEIGHT soldering gun has "thermostatic brain" that automatically regulates wattage from maximum to minium, assuring constant heat. Gun is brought to exact required temperature just seconds after trigger is pulled, states manufacturer.

All guns have steel-clad tips. Some have built-in, 10-watt spotlights. Two models have interchangeable tips and element assemblies, giving them power range from 150 watts to 650 watts. Guns operate from a-c or d-c outlets.

GARDEN CITY INDUSTRIES, INC.

• • •

Microgradiograph

89 UTILIZING a new miniature X-ray tube with a very thin beryllium window, this 5-kv contact microradiograph unit ("Type CMR5") applies the principle of contact radiography by bringing the specimen into close contact with a photographic emulsion having high resolving power. A photograph is then made with low-voltage (1-5 kv) X-rays. Good contrast is said to be obtained because only a small amount of the soft X-radiation is absorbed by the beryllium window.

The tiny X-ray photo is optically magnified by means of a light- microscope, and the negative obtained is enlarged to desired size by regular photographic procedures.

The unit measures approximately 18 in. wide by 13 in. high by 9 in. deep. It operates from a standard 115-volt a-c supply circuit and is easily portable.

NORTH AMERICAN PHILIPS CO., INC.

For more information use card on page 81

REMARKABLE NEW STEEL

for heavy-duty welded equipment

Strong, tough USS "T-1" Steel improves performance . . . reduces costs

IN this new engineering material—USS "T-1" Steel—you get a combination of mechanical properties never before obtainable in a single steel.

In "T-1" you get great strength (a yield strength of 90,000 psi.), yet you can fabricate this steel easily and at low cost. You get a steel with good creep and rupture resistance at temperatures as high as 900° F., yet so inherently tough that you can also use it in heavy duty jobs at *sub-zero* temperatures down to −40° F. In "T-1", in brief, you get a steel that withstands severe impact abrasion and, at the same time, resists corrosion at all temperatures.

This unique combination of properties helps you to cut costs and improve performance in an extremely wide range of industrial applications.

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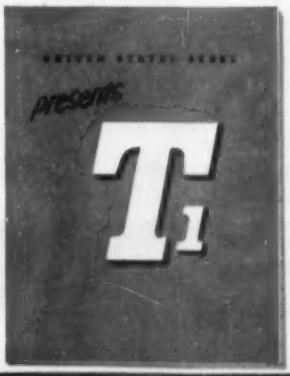

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Illustrating Ruemelin Fume Collectors in action. Part of a group of sixteen collectors at plant of Sterling Wheelbarrow Co., Milwaukee.

Collects fumes at the source! Counterbalanced inlet hood stays in working area automatically. Hoods have great lateral and vertical range for table, positioner or floor use. Thousands in every day service. Write for bulletin 37-E.

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FIRST TRULY PORTABLE 200 AMP. OUTPUT ARC WELDER

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Sensational new transformer development produces far more power to pound! The BREN/WELD does work of conventional welders 4 or 5 times its size and weight . . . Actually delivers up to 250 amps at reduced duty cycle.

Simple to use, fully guaranteed, it operates on 110/220 volts AC, 50/60 cycles; handles electrodes from 3/64" to 5/32". Has adjustable arc voltage for different arc characteristics. Ideal for plant production and maintenance, for construction work, railroads, on the farm or home.

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KASSON DIE & MOTOR CORPORATION
Integrity Since 1919
32-14 NORTHERN BOULEVARD, LONG ISLAND CITY 1, N. Y.

Stud-welding gun

90 STREAMLINED stud-welding gun, the "NS-9," has swept-back handle through which cables enter a steel barrel that extends through plastic gun body. Smooth-barrel design and elimination of side cable loop greatly simplify accurate stud alignment, it is claimed. Number of electrical connection has been reduced from three to one. Arc length can be adjusted without disassembly. The new gun weighs about the same as the old type.

NELSON STUD WELDING DIVISION.

• • •

Templates

91 CLAIMED to be an inexpensive aid to accurate pipefitting, "Wrap-Around" templates come in all standard pipe sizes from 2 to 20 in. Directions are printed on all templates, which should be used only once to maintain accuracy. Template is wrapped around pipe, taped in place and desired contour line is center-punched.

REE ASSOCIATES.

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Electrode

92 FAST rate of deposit, uniform bead characteristics and easy slag removal are some of the features claimed for a new Monel electrode. Called "Pacific Monel," it is said to be ideal for metal-arc welding of Monel to itself, Monel to steel and nickel to steel. It is an all-position electrode and is manufactured with a special uniform flux coating for application by a-c or d-c equipment.

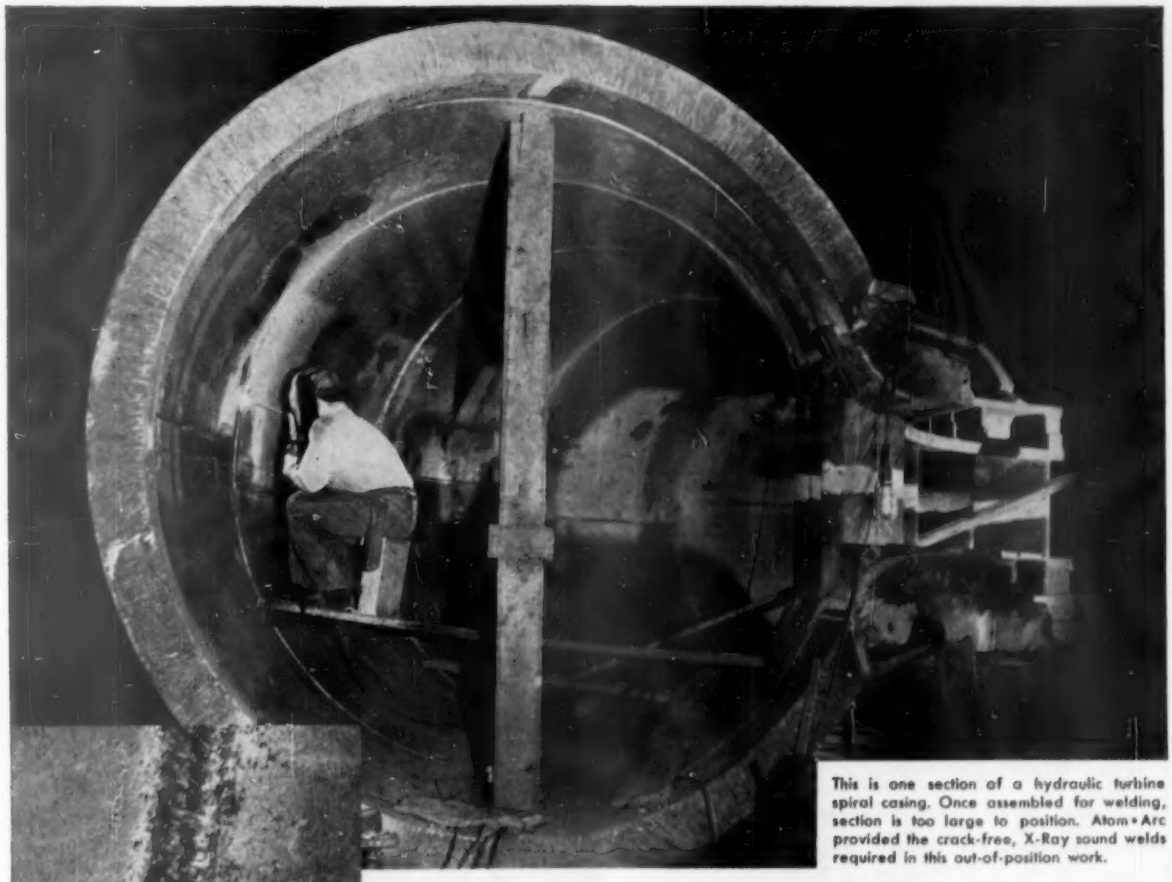
PACIFIC WELDING ALLOYS MFG. CO.

• • •

Cutting torches

93 Two new cutting torches and their tips are "Rigger H" for propane cutting and "Rigger A" for cutting with acetylene, propane and natural gas. Said to be in the low-cost range.

UNIVERSAL CUTTING AND WELDING EQUIPMENT MFG. CO., INC.



This is one section of a hydraulic turbine spiral casing. Once assembled for welding, section is too large to position. Atom•Arc provided the crack-free, X-Ray sound welds required in this out-of-position work.

Double V butt girth joint between 1½" thick wrought steel plate to spec: A285-50T Grade B, firebox quality (left), to the cast steel flange ring. The illustration shows a section of the vertical weld.

X-RAY SOUND WELDS in ALL POSITIONS

with ATOM•ARC 7016

"ATOM•ARC 7016 electrodes gave us crack-free welds, X-Ray soundness, and the high physicals required with greater ease and efficiency."

Plant Superintendent
S. Morgan Smith Co.

Double V butt joint welded vertically up with Atom•Arc 7016 electrodes in castings of four inch thick, Grade 65-35 A27-50T steel. The use of Atom•Arc electrodes in this joint eliminated weld cracking which had been prevalent when conventional electrodes were used.

Every weld X-Ray sound in this huge hydraulic turbine spiral casing at S. Morgan Smith Company, world's largest manufacturer of hydraulic turbines. ATOM•ARC, the new iron powder low hydrogen electrode was selected for this job because it *could* meet the requirements for soundness and physical properties in out-of-position work. In addition they found that ATOM•ARC gave them better penetration, laid down a smoother deposit, and was easier for the welders to use than other electrodes ordinarily used for this work.

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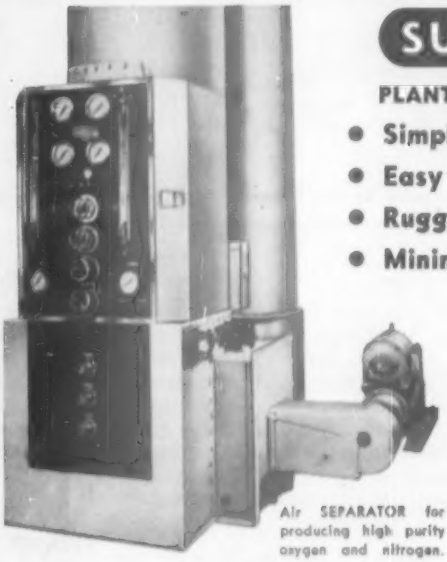

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Also manufacturers of plants for producing liquid oxygen—liquid nitrogen—liquid air also Storage and Transport Containers for all liquefied gases.

Low-hydrogen electrode

94 "STRIKEASY LH-1" is new low-hydrogen electrode with powdered metal in the coating. In a controlled test, a 61% higher deposition rate was achieved. X-ray analysis of test plates showed quality of deposits equalled weld metal of conventional E-6016 electrodes, manufacturer states. The electrode is said to provide a smooth, soft arc which is easy to handle because the rod can be used with the contact technique, though open arc is preferred. It can be used on a-c or d-c, reverse polarity. Typical mechanical properties, as welded: tensile strength, 85,000 range; yield, 70,000 range; elongation, 25 to 35% in 2 in.; reduction of area, 60 to 75%. GENERAL ELECTRIC CO.

NEW PRODUCT BRIEFS

95 **Three** colored lights signal relative hardness of test piece in new "color-glance" Brinell hardness testing machine. STEEL CITY TESTING MACHINES, INC.

• • •

96 **Standard** welding fittings for use on low-pressure transmission and distribution lines in gas, water and refining industries are precision cut by machine into sections, trimmed with standard bevels and ready for vee-welding. GAS ARC SUPPLY.

• •

97 **Rotary** electric "impactool" is multipurpose tool which, with standard attachments, will wire brush, drill, tap, ream, drive screws, etc. INGERSOLL-RAND CO.

• • •

98 **Portable** electric drill can be used with abrasive discs to sand metal, remove paint, etc. Special bracket and grinding wheel convert "Model 137" into electric bench grinder. PORTER-CABLE MACHINE CO.

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99 **Transparent,** scratch and abrasion-resistant glazing material, "Homalite CR-39," is suitable for safety goggles, shields, wheel guards, etc. THE HOMALITE CORP.

• • •

100 **More** efficient and easily maintained dust-collecting unit is result of several recent design changes, according to this manufacturer. "Dustkop Model 11w50" has had overall height reduced, and connecting of dust roller cans has been made easier. AGET MFG. CO.

Tractor parts rebuilt with

AMSCO LEADER AUTOMATIC ELECTRIC WELDER

Save contractor $10,000 over replacement parts, double service life

If you operate track-type equipment, here's an automatic electric welder that is a *must* for your maintenance shop. It will save you time and money, and radically increase service life of your present equipment.

See what it did for one construction outfit:

Operating five large track-type tractors, each with 12 bottom rollers, 4 carrier rollers, 156 track links, 78 grouser pads, 2 idlers, 2 sprockets and one dozer blade, replacement cost was figured to be approximately $13,800. Rebuilding these parts with the Amsco Leader cost approximately $3,700, or a saving of about $10,000. Plus the fact that the rebuilt parts gave nearly double the effective service life of the new parts.

See your local Amsco Distributor today. Ask him for complete details on the Amsco Leader. See for yourself how a new Amsco Leader can save you thousands of replacement dollars.

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AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, Ill.

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AC-DC WELDING ELECTRODES

A — Gives you all the advantages of tough, ductile Manganese-Nickel Steel weld deposits yet runs as easily as stainless or mild steel electrodes.

B — Not a composite rod. Alloys in rod, not coating.

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NEWS . . . . . *from page 6*

spray and sea air ("Making the ocean a test tube," WELDING ENGINEER, Sept., 1952).

Although the area was reduced to a shambles, a company spokesman said the disaster marked only a temporary interruption in Inco's research activities at the station. The firm plans to enlarge the razed site at Kure Beach.

* * *

Welding prominent in Western Metal Show

NUMEROUS welding demonstrations will be part of the 9th Western Metal Congress & Exposition, which is scheduled for March 28 through April 1 in Los Angeles. Headquarters for the Congress will be the Ambassador Hotel, and the show will be held in Pan-Pacific Auditorium. About 300 exhibitors will fill 150,000 sq ft of floor space to demonstrate new products, methods and services.

More than 20 technical societies, including American Welding Society, will participate in and co-sponsor the event. An attendance of 50,000 is expected.

* * *

Aget combines sales and manufacturing divisions

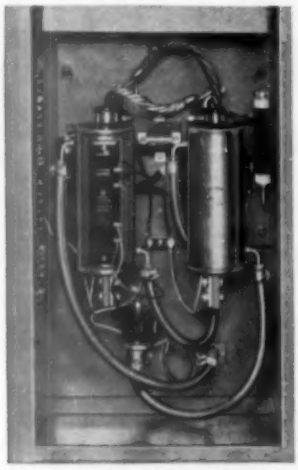
SALES and manufacturing divisions of Aget Mfg. Co., Adrian, Mich., have been combined at the firm's executive headquarters, 1408 E. Church St. For the past 15 years, Aget's marketing headquarters were at Ann Arbor, Mich., where sales were made through the company's exclusive agent, Aget-Detroit Co. This arrangement has been terminated.

Aget manufactures dust and vapor collectors, which are sold under the name "Dustkop."

* * *

Tig welding

STAINLESS steel facing holds 568 stainless tubes in place at end of all-stainless condenser, one of three fabricated for the Atomic Energy Commission at the Berkeley, Calif., plant of U. S. Steel's Consolidated Western Steel Division. G. W. Holt welds one of the tubes to sheet face by Tig method.



Often a single G-E Temperature-controlled Ignitron will also control operation of one or more standard ignitrons.

AT NEW LOW PRICES G-E WELDING IGNITRONS GIVE YOU TWO CONTROL FEATURES FOR COST OF ONE!

1. **Over-temperature control that's fast, sure, precise . . . prevents costly tube burnouts.**
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CHECK new low G-E prices at right! Other temperature-controlled ignitrons at these prices include no water-control feature! Means you lose out on that important operating economy—a big saving in dollars, if you buy cooling water.

If you draw from your own wells, General Electric's 95% reduction in water safeguards you against dry-season shortages. Your welders can operate every working day in the year, no matter what the sub-surface water level.

Furthermore . . . only G.E. brings you controls that are part of the tube itself, with sealed-in life adjustment! Ask your G-E tube distributor why G-E Ignitrons (1) mean more and better performance for your money, (2) give you temperature-controlled tubes that are built in *one integrated unit* by one manufacturer, carrying full G-E warranty throughout! *Tube Department, General Electric Company, Schenectady 5, New York.*

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161-181

free literature..... USE CARD ON OPPOSITE PAGE

1 BRAZING FLUXES—United Wire & Supply Corp. "Research Studies of Brazing Fluxes" is title of 12-page illustrated Bulletin F-37. It includes data from reports of Dr. H. L. Anthony, Mellon Institute, and Dr. Bruce W. Gonser, Battelle Memorial Institute.

2 ULTRASONIC SOLDERING—Aeroprojects, Inc. 6-page illustrated brochure describes "Sonobond" ultrasonic soldering equipment for fluxless soldering of aluminum, magnesium, copper and silver. Shown are typical applications.

3 WELDING DATA—The Babcock & Wilcox Co. Technical Data Card 162 is 4-page folder that describes welding of stainless tubular products. Included is a table of recommended arc-welding procedures that suggests electrodes, preheating and post-weld heat treatment. Other welding processes are also discussed.

4 STUD WELDING—KSM Products, Inc. 8-page brochure pictures and describes stud-welding equipment and applications.

5 PIPE WELDING—Arcos Corp. 10-page illustrated bulletin explains use of "EB Weld Insert," a specially-shaped material and a process for faster pipe joining. It was developed by Electric Boat Div., General Dynamics Corp.

6 SILVER BRAZING—American Platinum Works. "A Complete Guide to Successful Silver Brazing" is title of 46-page illustrated manual prepared for engineers and brazing operators. All aspects of brazing applications and problems are said to be treated in understandable manner.

7 POSITIONERS—Livingaire, Inc. 2-page leaflet pictures and describes welding positioners powered by hydraulic pressure. Turntable unit is complete assembly that can be used to perform automatically circular or contour welding operations.

8 INDUCTION HEATING—Electric Arc, Inc. Profusely illustrated 24-page brochure lists advantages and describes Smith-Dolan system of low-frequency induction heating for preheating and normalizing of weldments.

9 INDUSTRIAL TUBES—Amperex Electronic Corp. Literature packet includes charts, catalogs, article reprints and folders on ignition, thyratron and rectifier tubes used in welding and induction-heating equipment.

10 WELDING DESIGN—The Lincoln Electric Co. "How to Save on Fabricating Cost" is No. 9 in series of "Elements of WelDesign." Bulletin 873B lists five ways to cut costs, includes charts and diagrams.

11 PREHEATING—Tempil Corp. "Preheating for Welding" is reprint of article by A. B. Tesman that appeared in *The Welding Journal*. Reviewed are welding procedures that have been found to produce crack-free joints under a variety of conditions.

12 A-C WELDER—General Electric Co. Descriptive Bulletin GEC-1259 gives specifications and features of a complete new industrial line of low maintenance, a-c welders for high-speed production. Models are NEMA rated at 300, 400 and 500 amp.

13 EXHAUSTERS—Chicago Blower Corp. Bulletin GPE-103 contains detailed information and performance tables regarding "Gyra-Flo" power exhausters designed to deliver great volumes of air at low noise level.

14 TOGGLE CLAMPS—Detroit Stamping Co. Engineers and draftsmen may now secure complete sets of 68 new tracing templates of "De-Sta-Co" toggle clamps. Kits are available in any one or all of three sizes—full, half or quarter scale.

15 HARDFACING ELECTRODE—Mir-O-Col Alloy Co., Inc. Free samples of "Moly-Mang" hardfacing electrode are available with descriptive literature. Electrode is especially recommended for build-up of manganese castings.

16 RESISTANCE WELDER—Sciaky Bros., Inc. Bulletin 313-12 illustrates and describes the "SX 36 G," a multiple-electrode machine for high production resistance-welding applications. Unit has universal multiple-gun base with two seperate platen units that operate independently.

17 TESTING MACHINE—Baldwin-Lima-Hamilton Corp. "Sonntag Model SF-4" fatigue machine of 13,000 lb capacity is presented in new 2-page Bulletin 4214. Elevated-temperature testing, principles of "constant-force" operation and specifications are included.

18 CONTROL VALVES—Ross Operating Valve Co. Illustrated Bulletin 307 contains recommended service information, parts list and installation and operation data on rotary-handle action or "Pancake" valve. The four-way valve, 2 in. high, has poppet-type seals.

19 GRINDERS, CHIPPERS—The Rotor Tool Co. 56-page Bulletin No. 38-A illustrates and explains line of air tools for various applications. Included are chippers, grinders and scalers used in welding operations.

20 WELDING MANUAL—Eutectic Welding Alloys Corp. "How to Overcome Your Welding Problems and Improve Your Welding Technique" is title of 8-page illustrated booklet written for weldors by weldors.

21 ABRASIVE WHEELS—Bay State Abrasive Products Co. Many general specifications are included in this firm's latest brochure on tool-room grinding wheels.

22 WELDING FIXTURE—Cayuga Machine and Fabricating Co., Inc. Illustrated Bulletin No. 5305 describes ram pedestal, an automatic welding fixture designed for longitudinal welding and for use in conjunction with turn tables, turning rolls and positioners.

23 STAINLESS ELECTRODES—A. O. Smith Corp. 24-page Bulletin WE-166 covers in detail metallurgy and stainless steels, provides a Smith stainless-steel electrode selector table and offers material on welding processes. Electrodes are described in detail. Illustrated.

24 WELDING EQUIPMENT—Air Reduction Sales Co. Complete specifications and stock number information are supplied in new condensed 52-page Catalog ADC 662B, which lists general welding and cutting products used in job shops, maintenance departments and other establishments.

25 GRINDING WHEELS—Cincinnati Milling Products Div. 4-page brochure (PGS-303) depicts line of grinding wheels that can be used for finishing welded joints.

26 WELDED CONNECTIONS—Erico Products, Inc. "Full Load Capacity" is title of 4-page illustrated brochure showing typical "Cadweld" installations.

27 EXHAUST HOSE—The Flexaust Co. 4-page illustrated Bulletin No. 41 describes useful accessories that facilitate installation of hose and duct for industrial applications.

28 REPAIR BRAZING—Handy & Harman. Bulletin No. 14 is entitled "How to Repair Broken Cutting Tools with Easy-Flo." The product is a low-temperature, silver brazing alloy. 16 pages, illustrated.

29 DIAMOND WHEELS—Norton Co. Catalog No. 1233 contains comprehensive assortment of standard sizes of diamond grinding wheels and hones.

30 BRAZING RODS—Atlantic Gasflux Co. 22-page booklet in color describes three low-temperature brazing rods for production, repair and maintenance. The three: Tobin bronze, low-fuming bronze and nickel-silver rods.

31 WELDING RODS—Mueller Brass Co. 4-page color booklet lists advantages of brass and bronze rod for production and repair welding by the oxyacetylene process. Chemical and physical properties of rods are given.

WELDING INFO-AIDS

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Getting all the information about all the significant new developments in welding every month is a tough . . . and time-consuming . . . job. To save your time, the editors of WELDING ENGINEER screen scores of new catalogs and bulletins each month and select only the ones they think will be of interest to you. These are summarized for your convenience on page 80. The companies issuing this material welcome your request for copies.

To save your time in making such requests, simply use one of the attached post cards.

For catalogs, bulletins and other Free Literature, simply circle on the post card the numbers which correspond to Free Literature offerings on page 80.

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Pure copper tips withstand heat and wear. Swaged passages, streamlined flow, precision ports for maximum flame stability.

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Ball in sealing end of stem keeps valve gas-tight. Closing valve tightly repairs a scored seat.

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Seamless brass internal tubes rigidly anchored to withstand hard use. Coiled oxygen tube suppresses flashbacks.

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High-strength, wear-resistant bronze; protected seating surfaces.

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Easily replaceable "O" rings of long-lived synthetic rubber eliminate critical metal-to-metal gas seals.

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Welding heads snap in and out of blowpipe, seal gas-tight with one easy motion, lock in any working position.

TELLTALE MIXERS

Disk-type mixer in each head resists flame pops and backfires, eliminates burnouts. Number marked on mixer designates both head size and hourly gas flow.

The new W-202 PUROX Blowpipe easily welds anything from lightest sheet to heaviest plate or casting. Although built for rough use, it is lightweight, easy to handle, and well balanced in any working position. Overlapping welding ranges of its 13 head sizes (2 to 100 cu. ft. per hr. capacity) permit choice of hard or soft flame for any metal thickness.

Like all PUROX Blowpipes, the W-202 is moderately priced and thrifty to use. Come in today and see for yourself the many features that make it such an outstanding buy.

PUROX
TRADE-MARK

Get it from your LINDE Jobber

or write for further information. LINDE AIR PRODUCTS COMPANY, 30 E. 42nd St., New York 17, N. Y. In Canada: Dominion Oxygen Company, Toronto.

The term "Purox" is a registered trade-mark of Union Carbide and Carbon Corporation.

If You'll Just Check the EXCLUSIVE Advantages of the

NEW HI-AMP

ELECTRODE HOLDER—

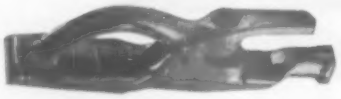
you won't use any other type!

Write Today for the complete story of the all NEW HI-AMP Electrode Holder and Ground Clamp.

- Spring completely enclosed and insulated. Cannot be knocked or shorted out.
- Spring Adjustment Screw for ease of replacement and adjustment to rod size.
- Handle cannot absorb moisture—withstands higher temperatures.
- Spring cannot be knocked out.
- Spring adjustment screw for easy replacement or adjusting.
- Sturdily built for excessive abuse.
- Designed especially for all-round welder's needs.

and that goes for Ground Clamps, too!

- Tip Insulators reversible for longer service life.
- Low Trigger for ease of Rod relief—cuts down operator fatigue.
- Slender rod gripping tongs to get in tight places.



Sold only through Welding Supply Distributors throughout the U.S. and Canada

Weld with Wagner

WAGNER MANUFACTURING CO.

250 W. 1st SOUTH ST. JACKSON, MISSOURI

Are REJECT WELDS killing your profits?

avoid scrap loss, reworks with DryRod Electrode Oven!

Engineers say most defects in high-strength welds — X-ray porosity, rough welds, underbead cracking, etc. — are caused by moist electrodes. DryRod — the original shop-tested *circular* electrode oven — safely preserves the manufacturer's "baked-in" quality . . . keeps rods within the .2% moisture limit allowed. Protect yourself against costly rejects, reworks, scrap loss . . . preserve electrodes conveniently, at low cost, with DryRod. Write for free bulletin.

Type 300 Oven

Automatic thermostatic control, 175 to 550° . . . holds 350 lbs. of 18" rods . . . safe, adequate 840-watt heater . . . completely wired for 110/220 or 220/440 volt AC . . . sturdy welded-reinforced sheet metal construction . . . insulated — low heat loss, low upkeep.

DryRod—Trademark X-DR-13

Cut costs 4 ways with DryRod Method

1 Store sealed cartons in warm, dry place.

3 Locate DryRod as close to welding operations as possible.

2 Place unpackaged electrodes in DryRod Oven and withdraw as needed.

4 For flexible, large-volume storage, stack ovens with compact DryRod Stands.

DryRod DIVISION OF Phoenix Products Co.
4715 N. 27TH ST. MILWAUKEE 16, WIS.

NWSA West Central Zone meeting draws 98 persons

THE National Welding Supply Association's recent West Central Zone meeting in Omaha was attended by 98 delegates and guests. Vice-president C. S. Rutherford, R & R Welding Supply Co., Des Moines, Iowa, presided.

Applications for active membership were received from Bock Bros. Welding Supply Co., Fort Dodge, Iowa; Minneapolis Oxygen Co., Minneapolis; and Monroe Welding Supply Co., Sioux City, Iowa.

On the first day, President James N. Alcock, Saginaw Welding Supply Co., Saginaw, Mich., delivered a message entitled, "Raise Your Sights." Claude V. McBroom, Meredith Publishing Co., Des Moines, delivered an address on "Self-Improvement." P. E. Engler, The Balbach Co., Omaha, opened a discussion on "Welding Clinics—Their Arrangement and Value." Following this, a discussion of "How We Spend Our Advertising Dollar" was led by H. E. McDonald, McDonald and Wilson Sales Co., St. Louis.

Roger Johnson, Roger Johnson Advertising, Inc., Des Moines, spoke on "How to Economically Build an Efficient Catalog," basing his remarks in part upon experience gathered in compiling the new R&R Welding Supply Co. catalog.

The second day, delegates heard an address by O. K. Johnson, Business Men's Assurance Co., Kansas City, Mo. R. W. Poe, Tweco Products Co., Wichita, Kan., and P. D. Blake, Hohenschild Welders Supply Co., Inc., Kansas City, Mo., next introduced a panel discussion on effective sales training from the standpoints of manufacturer and distributor responsibility. "NWSA Profit and Loss Statements Are Revealing" was the subject of a discussion by H. R. Toll, H. R. Toll Co., Minneapolis. "Steps We Are Taking to Reduce the Number of Slow-Paying Accounts" was the topic of R. B. Cave, Dakota Welding Supply Co., Inc., Watertown, S. D.

* * *

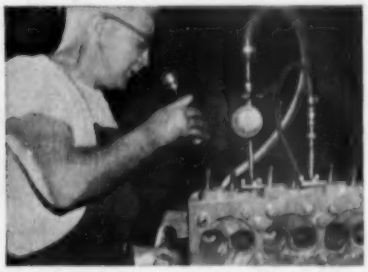
Maintenance show will treat metal-plant problems

MAINTENANCE problems of all types of metal-working factories will get special attention at the Plant Maintenance & Engineering Show to be held Jan. 24-27 at the International Amphitheatre, Chicago. A number of the 37 conference sessions will be devoted to particular problems of such plants.

Uses Ni-Rod for machinability... Ni-Rod "55" for heavy sections

Cast iron "welding team" simplifies maintenance, cuts costs for Buffalo bus company.

1. Good build-up – Worn valve seat on an engine from one of the 720 busses operated by Niagara Frontier Transit System of Buffalo, N. Y., gets built up with Ni-Rod electrodes. Before being welded, the oil-impregnated casting was degassed in an oven for a half hour at 900°F. Then it was cooled, wire-brushed and preheated to 400°F.



2. Like new with Ni-Rod – Valve seat weld gets close inspection. Then the seat is re-machined. And finally it's pressure-tested. At this point, the men charged with maintenance of this huge bus fleet consider the valve head as good as new. They give a lot of the credit to *the soundness and machinability* of Ni-Rod welds. Mr. W. W. Kunz, who heads the maintenance department says, "Using Ni-Rod and Ni-Rod "55" for repairs on 75 to 100 busses every year gives us a very substantial saving."

3. Chalk one up for Ni-Rod "55", too – A crack that's dangerously close to the cylinder liner gets marked for repair with Ni-Rod's companion electrode, Ni-Rod "55". For stiff sections, like this engine block, and for heavier sections, high phosphorous irons, Ductile Iron, Ni-Resist® and high-strength cast irons, welders choose Ni-Rod "55". Like Ni-Rod, you can often use it *without preheat or postheat.*

If you work with cast iron, you can use this "welding team" profitably in your operation, too.

With Ni-Rod® and Ni-Rod "55"® you can, like this bus company, save worn or damaged cast iron parts that otherwise you'd scrap; and you can also simplify cast iron assembly work.

Ni-Rod and Ni-Rod "55" electrodes are easy to handle. And even welders of limited experience can produce *sound, machinable welds.*

Write today and ask for our FREE FOLDERS ON NI-ROD AND NI-ROD "55".

The INTERNATIONAL NICKEL COMPANY, Inc.
67 Wall Street New York 5, N. Y.

INCO TRADE MARK **Welding Products**
Electrodes • Wires • Fluxes

FOR QUALITY WELDMENTS
use
Drawalloy
CORPORATION
QUALITY CONTROLLED
STAINLESS STEEL
WELDING WIRE

▶ available in Spools, Coils and Lengths

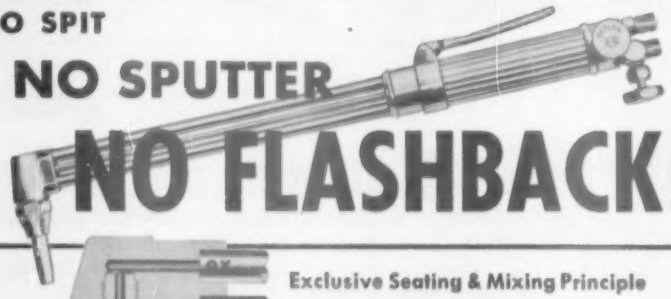
▶ for Automatic and Semi-Automatic gas and inert arc welding

Welding wire by Drawalloy is made to an exacting high standard . . . a high standard established by long-experienced welding men who know welding wire and how it must work. Set-ups for automatic and semi-automatic welding take more time than regular welding. That's why you want to be sure of satisfaction *before* you start. This *reliable* wire is weld-tested to give the best results every time. Write today for complete information and prices.

WELDING SUPPLY DISTRIBUTORS: Get prompt delivery on all sizes and grades of stainless and tool steel wire for gas and inert arc welding.

Drawalloy
CORPORATION
LINCOLN HIGHWAY AT ALLOY STREET • YORK 12, PENNSYLVANIA

NO SPIT
NO SPUTTER
NO FLASHBACK!



Exclusive Seating & Mixing Principle

Gases mix in tip—no combustible mixture in handle, tubes or head

No mixing cavity in head to accumulate a combustible mixture and cause flashback

Call your K-G Distributor or send for 24-page catalog. The K-G Equipment Co. (Inc.), Dept. A, 1744 Lehigh St., Allentown, Pa.

M-38 CUTTING TORCHES

K-G

M38E TORCHES
Available in any length on special order

"B" CUTTING TORCH
Economy version o. M38

Idaho distributor has new modern building

BUILT especially for the welding supply business, the building housing Norco Welding Equipment and Supplies, Boise, Ida., contains areas for welding demonstrations and special rooms for storage of carbide and acetylene. Office and salesroom comprise 3,000 sq ft, while the warehouse and dock occupy 4,000 sq ft. An attached garage for trucks has 1,100 sq ft.

The firm has a branch store in Twin Falls, Ida., and covers 19 counties in southern Idaho.

• • •

Canadian Trade Fair will include welding section

A WELDING and Metals section will be part of the Canadian International Trade Fair for the first time this year. Organized in cooperation with the Canadian Welding Society, the new section will display a wide variety of equipment and materials used in welding and metal-fabrication industries. The Fair will be held from May 30 to June 10 in Toronto.

Society President E. A. Gill announced that the group will hold its first national convention during the 1955 Fair. The Welding Society will present a series of lectures on new alloys, methods, equipment and standards.

• • •

Renner Mfg. Co. holds open house

AN open house was recently held at its new plant at Milwaukee by Renner Mfg. Co. More than 200 guests inspected the new shops and equipment, as well as a variety of steel weldments. The new quarter-million dollar plant measures 102 by 242 ft plus administration offices and contains 30,000 sq ft of floor space.

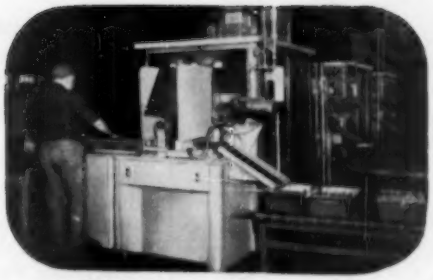
• • •

New model meant changes in 570 welding fixtures

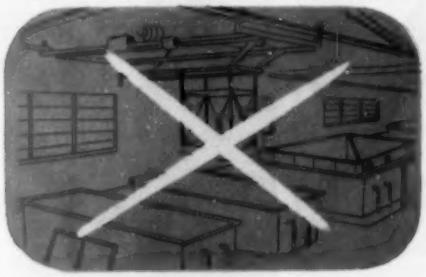
WHEN Ford Motor Co. changed the body styling of the 1955 Ford, it meant that 570 major welding fixtures also had to be changed in the firm's assembly plants.

"The banishment of cyanide pot headaches"

1. FEATURING: A "Big 3" auto maker and Lindberg high frequency induction heating units.



2. This famous auto maker bought three Lindberg units to heat treat valve tappet push rods.



3. Formerly rods were placed on fixtures, conveyed twice through cyanide pots and quench tanks.

Pushrods per minute per unit (maximum capacity)...51
Pushrods per hour, 3 units (maximum)....9,180
Pushrods per day on 2 shift, 8 hour basis (maximum).....146,880

4. The new Lindberg units harden both ends of pushrods at once—give high production—add uniformity and quality.

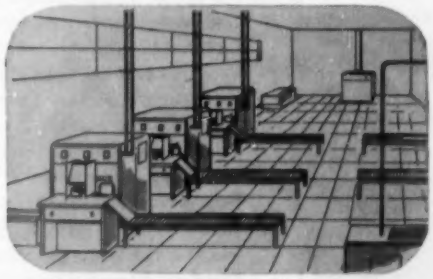
	Old Method	New Method
Operators	12	6
Power Costs	high	cut 50%
Cost per rod (Std. labor hrs.)	.00126	.00056
Cost of fixture replacements	high	none
Cost of Cyanide	high	none

5. Besides these savings, *down time and maintenance were cut to a minimum*; scrap rate cut to zero.

These headache causes banished!

1. Corrosive atmosphere
2. Health hazards
3. Cyanide disposal
4. Cost of salt
5. Replacement due to drag out.

6. Potential and actual problems from these negative conditions were all eliminated.



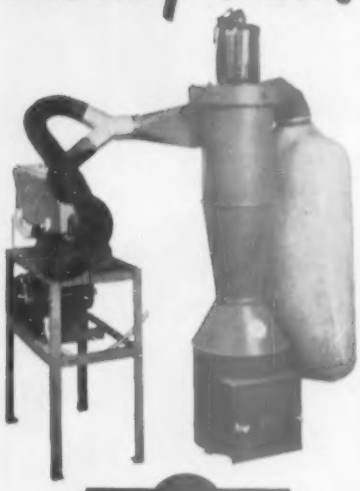
7. Plant space required for heat-treating cut 75%.

8. The general shop foreman says: "There's such vast improvement, I'd never cyanide again."

It will pay you to find out how we may be able to do a similar helpful job for you in your plant. Just write for our Bulletin 1441.

LINDBERG HIGH FREQUENCY DIVISION
LINDBERG ENGINEERING COMPANY
2477 W. Hubbard Street • Chicago 12, Illinois

Really draw!



TORIT

DUST COLLECTORS

A size and model to solve any dust collecting problem, Torit collectors provide complete, all-around dust control. Torit collectors are unitized for custom installation on each machine, giving power and suction only when machine is operating. Keeps plant and machines free from clogging and unsightly dust. Furthermore, cleaned and filtered air is exhausted back *into* the room maintaining heat balance. Find out now how Torit unitized dust control is engineered to your problems.

See our catalog in Sweet's Machine Tool File, or write:

TORIT

MANUFACTURING CO.

270 Walnut Street • St. Paul 2, Minn.

List some speakers for Midwest welding conference

WHEN the first annual Midwest welding conference is held next month at Illinois Institute of Technology in Chicago, those in attendance will hear from the following speakers:

John H. Blankenbuehler, engineer, Hobart Brothers Co., will discuss "Factors to Consider in Choosing Arc Welding Power Sources"; William G. Benz, Jr., senior welding engineer, M. W. Kellogg Co., will speak on "Welding Power Piping for Extreme Service Conditions"; and Carl E. Hartbower, chief of welding section, Watertown Arsenal, will have as his subject, "Welding, Brazing and Soldering Titanium."

Sponsored jointly by the Chicago Section of the American Welding Society and Armour Research Foundation of IIT, the conference will be conducted Feb. 8 and 9 on IIT's campus on Chicago's south side.

* * *

Joint Industry Conference on pneumatics this month

THE Resistance Welder Manufacturers Association will be one of the participants in a Joint Industry Conference on pneumatic standards, which is scheduled for Jan. 11 and 12 at Rackham Memorial Building, Detroit. The session was originally set for Dec. 14 and 15 but had to be postponed.

* * *

Piping contractor moves office to plant site

ROWLAND Tompkins & Son, Inc., piping contractor, has moved its main office from New York City to a new building recently erected at Hawthorne, N. Y., on property adjacent its storage shop and fabricating plant.

* * *

Spot-welding rig

FASTER production was achieved at Martin Aircraft, Baltimore, with use of handling rig for spot-welder operators. Assembly part is suspended at its center of gravity. In this position, part is free swinging and easily handled by one man.

Go to cylinder specialists for quality oxygen gas cylinders

It stands to reason: there is no substitute for experience. *Harrisburg Steel* is the pioneer and world's largest manufacturer of high-pressure gas cylinders made to I.C.C. specifications. And for decades, *Harrisburg Steel* has built reliable cylinders for all branches of the Welding industry . . . cylinders possessing extra margins of *quality* and *safety* . . . cylinders that perform better and last longer. Capacities range from 14 to 400 cubic feet . . . they are manufactured in both Domestic and Export types. The next time you order oxygen gas cylinders, may we suggest that you entrust your order to *Harrisburg Steel*. Meanwhile, write for catalog and current prices.

HSC-W-1/54

101 Years in Pennsylvania's Capital

Harrisburg Steel

CORPORATION HARRISBURG 15 PENNSYLVANIA

Vancouver distributor moves to new building

WITH its 35th birthday in the offing, Scott-Foster Ltd., Vancouver, B. C., Canada, welding distributor, recently moved to its new site at 1215 Clark Drive. The new structure houses 3,500 sq ft of office space and 4,000 sq ft of warehouse. Constructed of concrete block, its office and display area is on the main floor, while the warehouse is on the lower level. One of the new features is a demonstration booth.

The firm will celebrate its 35th anniversary in March of this year. It is a member of the National Welding Supply Association. Owners are C. A. A. Lind, G. M. Avery and J. A. Lindsay.

* * *

South Florida holds AWS organizational meeting

AN organizational meeting was held in Miami recently by the activation committee of the South Florida section, American Welding Society. Under the chairmanship of Thomas R. Berg, the group seeks a Florida charter.

* * *

Inco shows welding methods at Philadelphia power show

PROCESSES for welding stainless steels and applications of welded nickel-alloy steels were part of the International Nickel Co.'s exhibit at the 21st National Exposition of Power and Mechanical Engineering, which was held last month in Philadelphia.

* * *

Ventilator firm expands facilities

DONALDSON Power Ventilator Co. has enlarged its facilities at 11847 Vose St., North Hollywood, Calif.

* * *

Distributor appointments

Birdsell Mfg. Co., Inc., Palo Alto, Calif: Weldrod Co., Meadowbrook (Philadelphia area), Pa.

Hobart Brothers Co., Troy, Ohio: Goss Brothers Welding Supply, Falls Creek, Pa.

Hose Accessories Co., Philadelphia: Durrie Sales Co., Chicago.

Marquette Mfg. Co., Inc., Minneapolis: H. R. Toll Co., Minneapolis.

AT THE FRONTIERS OF PROGRESS YOU'LL FIND . . .

NEW Aircosil

AIRCO'S COMPLETE LINE OF SILVER BRAZING ALLOYS

Here is Airco's brand new line of silver brazing alloys — AIRCOSIL — available in rod, wire, sheet, rings, and gaskets, as well as special forms and shapes . . . for economical, high-quality brazing of sheet metal and tubing. Standard AIRCOSIL types available, as well as special analyses, for joining ferrous, nonferrous, and dissimilar metals.

AIRCOSIL 45: 45% silver plus copper, zinc, cadmium. 1125° F. to 1145° F. Most popular alloy available. Lowest temperature. Very free-flowing and very high strength.

AIRCOSIL 50: 50% silver plus copper, zinc, cadmium. 1160° F. to 1175° F. Government Grade IV. Very popular. High strength.

AIRCOSIL 35: 35% silver plus copper, zinc, cadmium. 1125° F. to 1295° F. Long plastic range. Ideal for making fillets. High strength, all metals.

AIRCOSIL 3: 50% silver plus copper, zinc, cadmium, 3% nickel. 1195° F. to 1270° F. The standard alloy for brazing carbide tool tips to steel shanks.

AIRCOSIL 15: 15% silver plus copper and phosphorous. 1185° F. to 1280° F. For copper, brass, and bronze. Self-fluxing on copper.

NEW AIRCO SILVER-BRAZING FLUX!

Available in paste form, AIRCOSIL Flux liquefies and becomes active at a slightly lower melting temperature than AIRCOSIL. Will not freeze or crystallize. Residue washes off in hot water. Available in ½, 1, and 5 lb. jars . . . also 30 and 65 lb. containers.

SEND TODAY FOR 20-PAGE SILVER BRAZING BULLETIN ..IT'S FREE

Air Reduction
60 East 42nd Street
New York 17, New York

Gentlemen:
Please send me your new Silver Brazing Bulletin.

Name_____

Street_____

City_____

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AIR REDUCTION

60 East 42nd Street • New York 17, N. Y.

Divisions of Air Reduction Company, Inc., with offices in most principal cities

Air Reduction Sales Company
Air Reduction Pacific Company

Represented Internationally by Airco Company International

Foreign Subsidiaries: Air Reduction Canada, Limited, Cuban Air Products Corp.

Products of the divisions of Air Reduction Company, Incorporated include: AIRCO — industrial gases, welding and cutting equipment, and acetylenic chemicals • PURECO — carbon dioxide, liquid-solid ("DRY-ICE") • OHIO — medical gases and hospital equipment • NATIONAL CARBIDE — pipeline acetylene and calcium carbide • COLTON CHEMICAL COMPANY — polyvinyl acetates, alcohols and other synthetic resins.

Crobalite
cobalt-chromium-tungsten
HARD-FACING ALLOYS

Easy to apply
by arc or torch. Flow on extra-readily in a uniform, slag-free layer.

Give Superior Resistance
to abrasion, corrosion, oxidation and impact—with high hardness—even at red heat.

Three Proven Grades
meet every requirement of production and maintenance, in every field.

FREE CROBALITE BULLETIN gives details. Write for it — today!

DISTRIBUTORS: We invite your inquiries.

Crobalt, Inc.
2800 S. State St., Ann Arbor 1, Mich.

30 YEARS AGO

(Taken from THE WELDING ENGINEER *of January, 1925)*

How a 70-ton oil tanker was constructed as a one-piece barge by the electric-arc process is described in this issue.

—30 YEARS AGO—

M. KEITH Dunham, Chicago, has announced the completion of his company's new acetylene-cylinder plant in Milwaukee.

—30 YEARS AGO—

THE Chicago, Burlington & Quincy Railroad recently placed an order for 45 portable arc welders with General Electric Co. They will be used in the road's erecting shops and engine houses.

—30 YEARS AGO—

F. A. MERRICK, vice-president and general manager of Canadian Westinghouse Co., has been elected vice-president and general manager of Westinghouse Electric and Mfg. Co.

—30 YEARS AGO—

H. W. HILL has been appointed general superintendent of acetylene plants for Air Reduction Co., Inc.

For Permanent Good Results in Welding

METAL BOND
SOLDERING AND WELDING
PRODUCTS

- TINNING COMPOUND—cleans and tins in one operation
- SOLDERING SALTS—takes place of acids—fast cleaner
- HARD METAL—for scored cylinders and cast iron soldering
- ALUMINUM SOLDER—for cast or drawn aluminum and die-cast metal
- MOULDOUGH—for backing up job to weld against
- BRAZING FLUX NO. 10—for brazing all metals
- SPECIAL NO. 31—cast iron brazing flux
- SEAL-X-O—for filling pin holes in electric welds
- CAST IRON WELDING FLUX NO. 4—also All Steel Wire Brushes and Rod Holders

Try them yourself—find out why they are so widely used. Our handy-size catalog will give you helpful advice—send for it!

METAL BOND MFG. CO.
3201 KOSSUTH AVE.
ST. LOUIS 7, MISSOURI

MORTON AUTOMATIC WELDING MACHINES FOR SUBMERGED AND INERT ARC

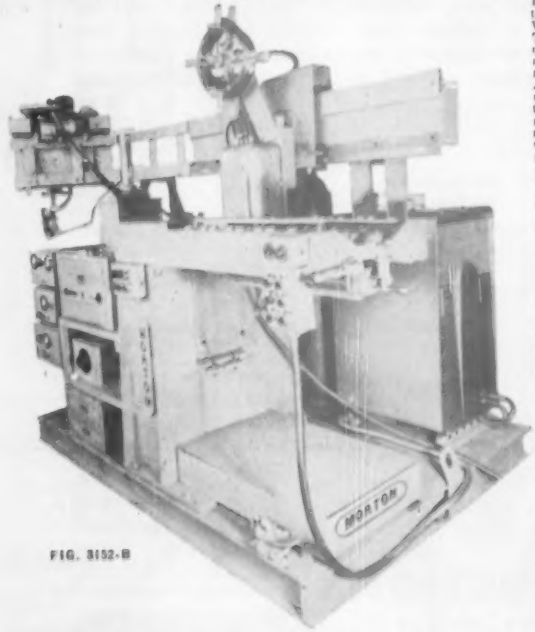

FIG. 3152-B

Fig. 3152-B. This shows a Special Morton Application of Multiple Welding Equipments to our Standard Horn Type Stake Welder. The machine is designed primarily for laboratory work. The rotating mechanism on the back of the machine carries complete sets of submerged arc, inert arc and sigma welding equipments. Any of the three processes can be used on the machine by the actuation of a master control button which sets up the electrical control. The machine is equipped complete with water pump and air compressor and can be furnished in any length and diameter capacity to meet your requirements.

Fig. 3145-B. Shows our New Design combination Press and Girth Welder. This machine is designed to make three simultaneous automatic arc welds on propane bottles. A center spindle driven headstock furnishes the basic rotary motion for welding. Twin air cylinders on the tailstock slide gives the necessary force for assembly of the bottle halves. Complete automatic welding and machine cycle control with automatic ejection were designed into this machine.

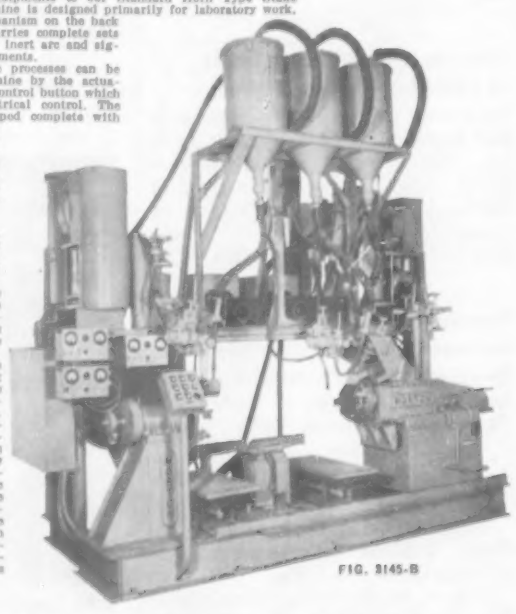

FIG. 3145-B

Our New Bulletin 48-B shows plant views, lists our product and some of our machine tool facilities for producing superior Machine Tools and Automatic Welding Machines. Send for your copy today.

Morton Finished Machine Keys comprising Gib Head—Plain—Feather—Hi-Pro—Woodruff and Specials will assure lower assembly costs through accuracies built into each key. A trial order will convince you.

MORTON MANUFACTURING COMPANY
Broadway & Hoyt, Muskegon Heights, Michigan

OREN G. RUTEMILLER, chief engineer for Morton Mfg. Co., Muskegon Heights, Mich., has left the firm to return to the Cincinnati area. SHERWOOD BASCH has been named acting chief engineer.

* * *

ROBERT BARLEY has been appointed general sales manager of Progressive Welder Sales Co., Detroit. He joined the firm as a product development engineer in 1942, and among his contributions was the development of the condenser discharge aluminum welder. After wartime service with the U. S. Navy, he returned to Progressive as national service manager. He was promoted in 1953 to assistant sales manager.

* * *

ROBERT BURNS, has been appointed manager of East-Central District of Belden Mfg. Co., Chicago producer of electrical cable and wire. He first started with Belden in 1936. His headquarters will now be in Chicago. Succeeding Mr. Burns as district manager for the South-Eastern Division is GEORGE MENA, who joined the firm in 1949 and was transferred from the Atlanta-Richmond territory.

* * *

PHILLIPS HAWKINS has been appointed assistant to vice-president, raw materials, of U. S. Steel Corp. J. ROBERT FERGUSON, JR., has been named chief engineer, project development, succeeding NORMAN C. MICHELS, who was recently appointed vice-president in charge of engineering for U. S. Steel's Tennessee Coal & Iron Division.

* * *

T. N. ARMSTRONG, a member of International Nickel Co.'s Development and Research Division in New York City, has been named chairman of the newly formed Committee on Interpretive Reports of the Welding Research Council.

It's a cuttin' fool!

Light heavy-weight cutting torch *It's a* **TRIPLE THREAT**

Look what this *NEW* Smith's Cutting Torch gives you:

It is brand NEW. It ingeniously combines more operating advantages than any you have ever seen. Trade tests to date have been sensational. Check these facts and write us today.

Does the work of a heavy-duty torch . . . but you should see how LIGHT it is — and easy to handle!

Cuts anything from tomato cans to 14" steel (using proper tips). Yet it's light-weight and perfectly balanced. A brute for performance but easy on the operator. We put into this torch what you and other operators asked for.

Slip-In-Tips — no wrenches needed.

Just slip the tip in, spin the nut with your fingers and you're ready to go. How could anything be easier? Try it yourself and see.

3 interchangeable controls — quick change from one to the other in less than 1 minute.

1. Over lever. *2. Trigger.* *3. Under lever as shown above.*

No matter what type of cutting jet control you prefer, you have it in this torch — and you can switch from one to the other any time you want. Adaptable to any personal likes or techniques. Reduces number of torches needed to accommodate all operators' requirements.

No slag . . . cuts clean.

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Ely

Hays

CHEEVER H. ELY has been appointed Cleveland district manager by Norton Co., Worcester, Mass., replacing FRED P. HAYS, who retired after 38 years of service. WILLIAM C. DAVIDSON succeeds Mr. Ely as abrasive engineer in the Dayton, O., area.

* * *

NORMAN C. MILLER and JOHN D. STEELY, staff members of Los Alamos Scientific Laboratory, were recipients of the second annual Coolidge Award, presented jointly by the Society of Non-Destructive Testing and the X-Ray Dept. of General Electric Co., Milwaukee. The award was conferred on them in Chicago during the Society's annual meeting. It was for their article, "Some Experimental Findings and Operating Practices in Betatron Radiography."

* * *

EARLE V. GROVER, president of Apex Steel Corp., Ltd., Los Angeles, was elected president of the American Institute of Steel Construction at the organization's 32nd annual convention, recently held at White Sulphur Springs, W. Va. He succeeds JOHN E. JACKSON, president of Pittsburgh-Des Moines Steel Co., Pittsburgh. L. ABBETT POST was again named executive vice-president.

* * *

DONALD M. HANSON has been appointed vice-president in charge of merchandising for Hubbell Metals, Inc., St. Louis. He has been with the firm 14 years. In addition to his new duties, Mr. Hanson will continue as manager of the brass and copper department. Active in the Copper and Brass Warehouse Association, he was made president of that group last March.

* * *

DAVID A. WALLACE has been elected director of The Federal Machine and Welder Co., Warren, O. Active in industry all of his adult life, Mr. Wallace was with Chrysler Corp. from 1929 until his retirment a year ago. He was made president of Chrysler Division in 1937 and remained in that position until he retired.

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ROBERT M. STECKER has joined the grinding-wheel sales staff of Electro Refractories & Abrasives Corp., Buffalo. He has been assigned the state of Wisconsin territory and will make his headquarters in Milwaukee.

* * *

HARRY G. PEACOR has been appointed regional manager for All-State Welding Alloys Co., Inc., covering Oregon, Washington, Idaho, Wyoming, Montana, northern California and western Canada. He will be responsible for sales and service to users and distributors of the White Plains, N. Y., firm's alloys and fluxes. Mr. Peacor has had extensive experience in welding, including duties as an instructor in the Navy, manager of a supply company and manager of a welding department for an industrial products firm.

* * *

FRANK A. NOWAK has been named to the sales engineering staff of Marquette Mfg. Co., Minneapolis. Mr. Nowak, who has specialized in application of welding to product design, has served as a welding engineer with International Harvester Co.'s Milwaukee Works, Machinery and Welder Corp., Milwaukee, and the Aero Div. of Minneapolis Honeywell Co. He will maintain headquarters in Marquette's home office.

* * *

SAMUEL S. AUCHINCLOSS has been named president of Cleveland Welding Co., a subsidiary of American Machine & Foundry Co. He will continue as president of DeWalt, Inc., Lancaster, Pa., also an A.M.F. subsidiary. He has been with the parent company 18 years.

* * *

D. T. WELLMAN, president of The Wellman Bronze & Aluminum Co., Cleveland, was elected president of The Magnesium Association at the group's tenth annual meeting, held in mid-November at St. Louis. He succeeds J. S. KIRKPATRICK, of Detroit.

* * *

EUGENE M. SMITH has been appointed assistant director of research for Lukens Steel Co., Coatesville, Pa. He formerly was development engineer for Youngstown Sheet and Tube Co., Youngstown, O.

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The companion No. 612 Jumbo Industrial Goggles are of the same style and appearance but molded from clear plastic for wide vision. They also have the conventional screen ventilators.

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If you have never used these goggles, we suggest that you write us for a sample pair of each on memo for test purposes. If after 30 days trial you do not find them thoroughly satisfactory, you can return them for credit.

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DR. BENNETT S. ELLEFSON has been named technical director of Sylvania Electric Products Inc., New York City. He succeeds E. FINLEY CARTER, who resigned to become head of research operations at Stanford Research Institute, Stanford, Calif.

* * *

D. J. WILLIAMS has been named manager of the Railroad Dept. of Air Reduction Sales Co., New York City. His offices will continue to be in Chicago, where he had served as manager of the Western region of Railroad sales, the job he held since 1934. He started with Air Reduction in 1917 on the West Coast, later becoming Pacific Coast manager. Mr. Williams took a leave of absence from 1942 to 1945, during which time he served in the procurement section, U. S. Navy.

* * *

PAUL ZEIGLER, director of Kaiser Aluminum & Chemical Corp.'s department of metallurgical research at Spokane has moved to the company's headquarters at Oakland, Calif. His responsibilities remain the same, but his new location will permit him to work more closely with management.

* * *

E. C. BREKELBAUM has been named assistant to the general manager of The Thew Shovel Co., Lorain, O. He joined the firm in 1952 as director of methods after 17 years with Harnischfeger Corp., Milwaukee. Mr. Brekelbaum is a member of the American Welding Society.

* * *

WALTER E. JONES, metallurgical development engineer at the Thomson Laboratory of General Electric Co., Lynn, Mass., has been named manager of vacuum melted products at Carboloy Dept. of G-E, Detroit.

* * *

STANLEY W. MADSEN has been appointed assistant vice-president and EDWARD H. STANN has been named treasurer of Shieldalloy Corp., division of Metallurgy, Inc., New York City.

* * *

NELSON S. HIBSHMAN, of Brooklyn, N. Y., has been appointed secretary of the American Institute of Electrical Engineers. He succeeds H. H. HENLINE, who held the post since 1932.

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OFFICES IN PRINCIPAL CITIES

The following personnel appointments were recently announced by The International Nickel Co., Inc., New York City: WILLIAM H. SPARR, JR., has been placed in charge of the steel section of the Nickel Sales Dept. in New York City; C. T. HALLER, JR., succeeds Mr. Sparr as head of the Pittsburgh technical field section, Development and Research Division; GEORGE L. HOOBLER has been promoted to the Pittsburgh technical field section; DR. KENNETH G. CARROLL has joined the staff of the Bayonne (N. J.) Research Laboratory as head of the newly created physics section.

* * *

NORMAN J. FROELICH has been elected president of Gulf Steel & Wire Sales Co., Pittsburgh, and vice-president and general manager of sales for Gulf Steel & Wire Co., Bayamon, Puerto Rico, manufacturer of welded chain, welding electrodes and rods, welded fabric and other wire and chain products.

* * *

ARTHUR T. HUNTER and FRED O. PAHMEYER have been elected vice-presidents of Combustion Engineering, Inc., New York City.

* * *

Died . . .

FRED H. JOHNSON, president of Progressive Welder Sales Co. and Progressive Welder Co., Detroit, died suddenly at his home Nov. 2. He was 58. Born on Funen Island off Denmark, Mr. Johnson came to the United States when he was 16. He founded Progressive in 1935. At the time of his death, he was also president of Progressive Welder Canada Ltd. and vice-president of Hydro Mfg. Co. A well-known humanitarian, Mr. Johnson and the late General W. S. Knudsen formed the relief organization "Save the Children Federation" in Rebild, Denmark. For his work, he was knighted by King Frederick IX of that country in 1950 and received other decorations.

* * *

R. A. VAUGHEN, owner of Welders Supply Co., Canton, O., died Oct. 25 following a heart seizure. He was an active member of the National Welding Supply Association.

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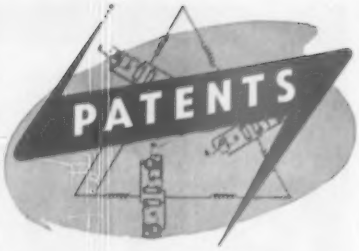


Helmet lens case

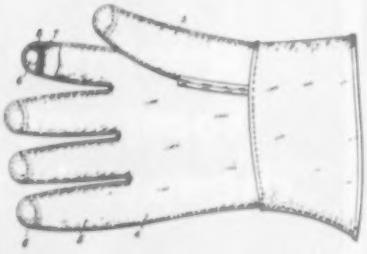
2,687,523. JOHN V. BERNHARDT, Eagle Mountain, Calif. Filed Nov. 6, 1952. Granted Aug. 31, 1954.

A lens case that has a rectangular body with aligned front and rear openings is the subject of this patent. An inturned rear transverse flange is at one end, and its opposite end is rounded and return bent, forming a rear transverse flange and a transverse chaimber at said opposite end. The chamber opens inwardly of the body. A roll of transparent film is located in the chamber and is adapted for unrolling past the front opening. The body has a transverse slot in the first end through which the free end of the film is withdrawn. A lens is in the body behind the film, and a spring in the body behind the lens bears against the flanges and lens. This holds the lens against the film. The spring also extends into the chamber to hold the roll of film in place.

* * *

Safety glove

2,686,316. WAYNE E. LINN, Westville, Ill. Filed Oct. 29, 1951. Granted Aug. 17, 1954.



This patent covers a protective hand glove with finger-enclosing portions. Partition members are inserted and secured within these portions and near the extreme ends thereof. They extend entirely across the said portions. Spacers of hard non-compressible material are interposed between the partition members and the ends of the finger-enclosing portions.

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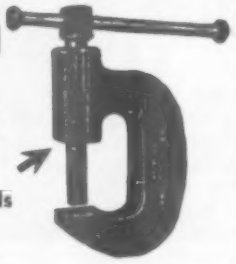

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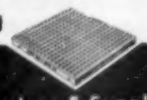

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A

Air Reduction Sales Co. 64, 65, 89
Allen Co., L. B. 97
Alloy Rods Company 75
All-State Welding Alloys Co., Inc. ... 96
American Manganese Steel Div. 77
American Optical Company 16-b
Ampco Metal, Inc. 8
Anti-Borax Compound Co. 92

B

Belden Mfg. Co. ..... Inside Front Cover
Bridgeport Brass Co. 10
Burdett Oxygen Co., The 63

B

Cam-Lok Division of Empire Products, Inc. 65
Carborundum Company, The 14-15
Chicago Boiler Company 96
Chicago Eye Shield Company 2
Chicago Mfg. & Distributing Co. ... 92
Colonial Abrasive Products Co. 17
Contour Marker Corp. 95
Crobalt, Inc. 90
Crucible Steel Co. of America 69

D

Dillon & Co., Inc., W. C. 76
Dockson Corp. 9
Drawalloy Corp. 86

E

Eastman Kodak Company 16
Erico Products, Inc. 54
Eutectic Welding Alloys Corp. 62

F

Fibre-Metal Products Co. 51

G

General Electric Company 18-19, 20
General Electric Co., Tube Dept. ... 79
Goldsmith Bros. Smelting & Refining Company 58
Grand Specialties Company 94
Gulf Steel & Wire 55

H

Hallwell Tool Company 92
Handy & Harman 68
Harnischfeger Corp. 59
Harris Calorific Co., The 11
Harrisburg Steel Corp. 88
Haynes Steelite Co., Div. of Union Carbide & Carbon Corp. ... 22
Hobart Bros. Company 1

I

International Nickel Co., Inc. 85

J

Jackson Products 4

K

Kasson Die & Motor Corp. 74
K-G Equipment Co., Inc.) 86
Krembs & Co. 94

L

Lindberg Engineering Company 87
Linde Air Products Co., A Div. of Union Carbide & Carbon Corp. 56-57, 83

M

Mallory & Co., Inc., P. R. 13
Metal Bond Mfg. Company 90
Metal & Thermit Corp. 12
Miller Electric Mfg. Co. 71
Morton Mfg. Company 90

N

National Carbide Corp. 78
National Cylinder Gas Corp. 53
National Welding Equipment Co. ... 7
Norris-Thermador Corp. 60

P

Page Steel & Wire Division 61
Phoenix Products Co. 84

R

Rankin Mfg. Company 95
Ruemelin Mfg. Company 74

S

Sellstrom Mfg. Company 94
Smith Corp., A. O. ..... Back Cover
Smith Welding Equipment Co. 91
Stulz-Sickles Company 78
Superior Air Products Co. 76
Sylvania Electric Products ..... Inside Back Cover

T

Taylor-Winfield Corp. 72
Tempil Corp. 93
Tillman Co., John 96
Torit Mfg. Company 88

U

Union Carbide & Carbon Corp., Haynes Stellite Company 22
Union Carbide & Carbon Corp., Linde Air Products Company 56-57, 83
United States Steel Corp. 73
United Wire & Supply Corp. 70

V

Victor Equipment Corp. 16-a

W

Wagner Mfg. Company 84
Weldrod Company 97
Westinghouse Electric Corp. 66-67

SEARCHLIGHT SECTION
(Classified Advertising)

H. E. Hilty, Mgr.

EMPLOYMENT

Selling Opportunities Offered 97

EDUCATIONAL

Schools 97

EQUIPMENT

(Used or Surplus New) For Sale 97

WANTED

Equipment 97

Do you have an INERT GAS welding problem?

Here are some tips that can save you money!

There's a right Sylvania Tungsten Electrode for every inert gas welding job . . . and a right technique for using the preferred electrode. The following welding helps are the result of field surveys and investigations by the research engineering staff of Rensselaer Polytechnic Institute, and Sylvania Electric Products, Inc.

A. C. WELDING

Metals Welded: Aluminum and magnesium are the metals most frequently welded with alternating current.

Tungsten Electrode: For the usual range of welding applications, Sylvania Zirtung electrodes will give the most dependable and the best performance. Under certain special conditions, Sylvania Thoriated Tungsten and Puretung Electrodes can be used acceptably.

If you have trouble with these problems . . . use these tips . . .

Difficult Starting	Clean work material thoroughly Use superimposed high frequency
Brittle Electrode Tips	Use larger size electrode
Excessive Heat in Electrode or Holder	Use larger size electrode Use centerless ground finish in larger size electrode
Freezing to Workpiece	Try longer arc Use a larger size electrode
Poor Penetration	Use higher current Try helium or a mixture of helium-argon

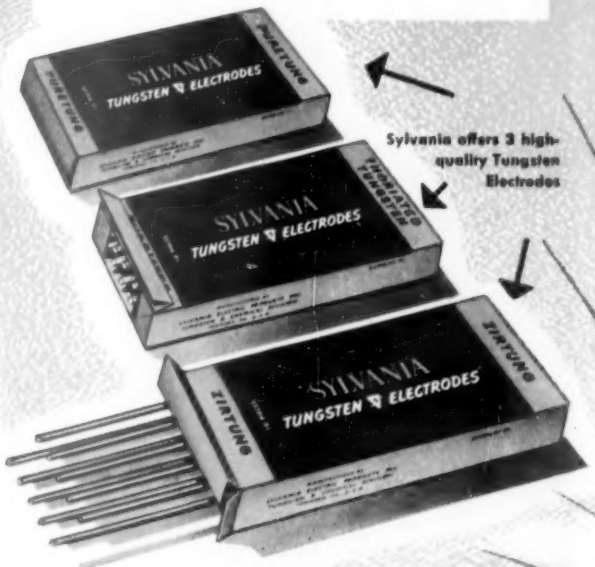
D. C. WELDING

Metals Welded: Stainless steel, inconel, monel and other similar metals.

Tungsten Electrode: For the usual range of welding applications, Sylvania THORIATED TUNGSTEN electrodes will give the most dependable and best performance. Under certain specialized conditions, Sylvania Zirtung and Puretung Electrodes can be used acceptably.

If you have trouble with these problems . . . use these tips . . .

Difficult Starting or Low Voltages	Point the electrode Try touch starting Use argon instead of helium Start fillets with filler rod (if permissible)
Brittle Electrode Tips	Point the electrode Use a larger size electrode
Excessive Heat in Electrode or Holder	Point the electrode Use a larger size electrode Use centerless ground finish in larger size electrode
Metal Pickup, Contamination of Electrode Tip, Erratic Arcs	Use a larger size electrode Use argon instead of helium
Poor Penetration	Use higher current Try Sylvania Zirtung Try helium or helium-argon mixes
Imprecise Welding (especially on fillets or tight corners)	Point the electrode Use starting block
Eroded Electrode	Use a larger size electrode Point the electrode Use a longer arc



Sylvania offers 3 high-quality Tungsten Electrodes

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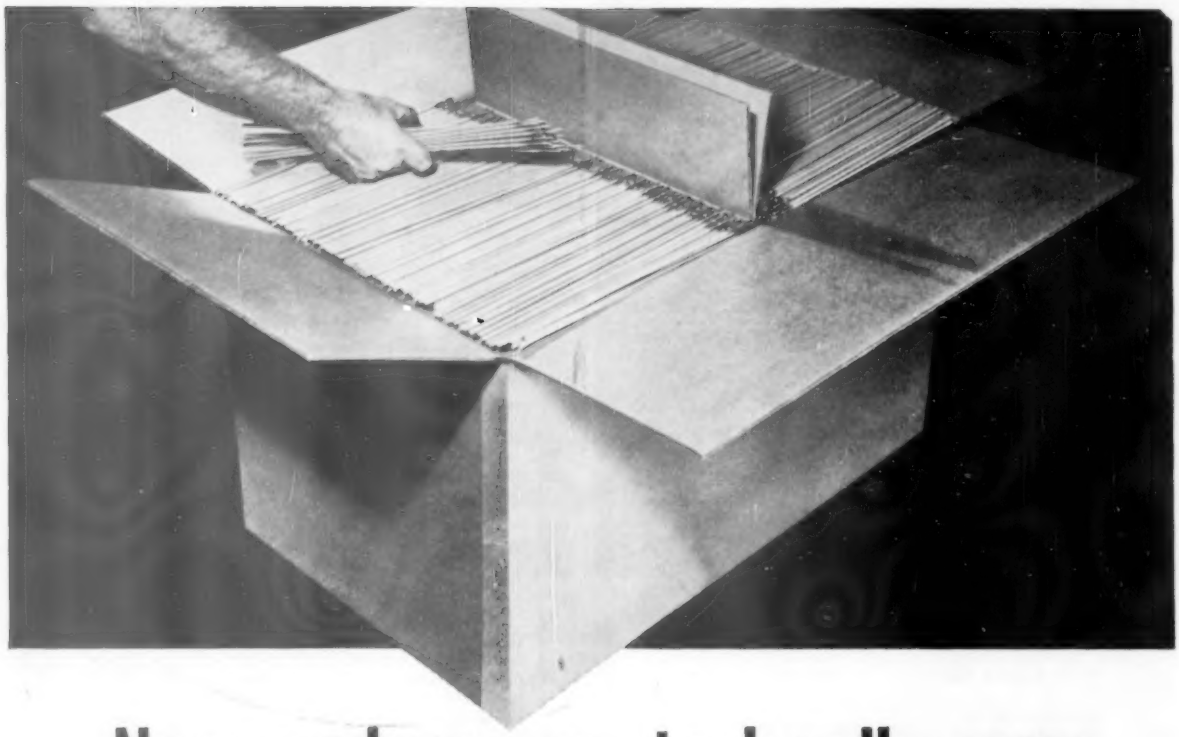

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